

ARITHMETIC TEST

This program checks the arithmetic section of the 1219B computer by a series of short tests which are controlled by an executive routine. All inter-register addresses, modifiers and other transmission paths within the specified arithmetic area are tested with multiple test patterns to determine operational capability. The tests will be executed in the following sequence, unless the sequence is altered by operator intervention:

- 1) AUT--A Upper Test
- 2) ALI--A Lower Test
- 3) LSAL--Left Shift A Test
- 4) RSAL--Right Shift A Test
- 5) ADER--Arithmetic Adder Test
- 6) KI--Shift Counter Test
- 7) CPAL--Complement A Test
- 8) ADD--Double Length Add/Subtract Test
- 9) MUL--Multiply Test
- 10) DIV--Divide Sign Test
- 11) DVT--Divide Test

The operator has the option of selecting either or both an error typeout or a computer console error display.

If PROGRAM SKIP 4 is not set Typeout Subroutines will provide the operator with a typeout of the status of the Arithmetic Test. If an error is detected, and PROGRAM SKIP 4 is not set, the title of the failing subtest and the correct and incorrect patterns will be buffered out in an error message, via channel 0, in field data code. However, in the Divide tests and the Arithmetic Adder Test, the error message format differs slightly. If PROGRAM STOP 0 is set and an error is detected, the test will stop with an error display in the AU and AL registers. The value in the P register along with the following Arithmetic Error Display Table are to be used to locate the failing subtest.

ARITHMETIC ERROR DISPLAY

If the Computer comes to a PROGRAM STOP 0 during the Arithmetic Test, an error has been detected. By referencing the address in P, this table will assist in determination of the error displayed.

SPECIFICATION SYMBOL
SB-10163

P EQUALS	TESTING	AU	AL
10710	ENTER AU	PATTERN	SAME
10750	ENTER AL	CORRECT	INCORRECT
11014	LSH AL	CORRECT	INCORRECT
11045 ^{11042?}	LSH AU	INCORRECT (AU & AL SAME)	CORRECT
11075	LSH A	CORRECT	INCORRECT
11132	RSH AL	INCORRECT	CORRECT
11164	RSH AU	CORRECT	INCORRECT
11230	RSH A	CORRECT	INCORRECT
11263	SEL COMP	CORRECT	INCORRECT
11371	ADDER	CORRECT	INCORRECT
11401	ADDER	CORRECT	INCORRECT
11407	ADDER	777777	SEE NOTE 1
11460	SHIFT COUNTER	CORRECT	INCORRECT
11536	COMPAL	CORRECT	INCORRECT
11565	COMPAU	CORRECT	INCORRECT
11620	COMP A	CORRECT	INCORRECT
11702	BORROW	(SUM OR DIFF IN A)	
11736	MULT SIGN	(PRODUCT IN A)	
11756	DIV SIGN	000001	000001
11755	DIV SIGN	000001	777776
12017	DIV SIGN	777776	777776
12036	DIV SIGN	777776	000001
12067	DIVIDE	REMAINDER	000000
12112	DIVIDE	NONE	SEE NOTE 2

NOTE 1: AL=N where N=22--the number of shifts done on the tables that are added.

NOTE 2: If AL=000777 Trouble is between AL and X
 If AL=777000 Trouble is between AU and D
 If AL=777777 Trouble is between B17 and A0

The Arithmetic Test may be run separately or as a part of the Integrated Command-Arithmetic Test. If it is run separately PROGRAM SKIP 2 must be set to remain in the Arithmetic Test.

The following is the operating procedure for the ARITHMETIC TEST.

- Disconnect the RIC TEST JUMPIN of the INTEGRATED TEST PROGRAM. The jumps and stops for this program are as follows:
- Load the ARITHMETIC TEST PROGRAM or the INTEGRATED TEST PROGRAM. The jumps and stops for this program are as shown in the following table.

PROGRAM SWITCH**PROGRAM ACTION**

PROGRAM SKIP 0

Set to recycle current subroutine upon error detection

PROGRAM SKIP 1

Set to recycle the executive routine (EXEC) without referencing the monitor ARITH.

PROGRAM SKIP 2

Set to remain in the ARITHMETIC TEST

PROGRAM SKIP 4

Set to suppress typeouts

PROGRAM STOP 0

Set for computer console error display

PROGRAM STOP 1

Set to end ARITHMETIC TEST (see Note 1)

PROGRAM STOP 2

Set to stop after error typeout

NOTE: With typeouts the test will end after a selected number of cycles (the number in address NYMB). Without typeouts the test will end after completion of the current cycle.
NYMB=10361.

- c. Set PROGRAM SKIPS and STOPS as desired according to the above table.
- d. Master Clear the Computer.
- e. Set the 1232/1532 channel number in AL bits 6 to 3.
- f. Set AL bit 8 if the I/O Console is a 1532.
- g. Set AL bits 17-15 as follows:
 - Set bit 17 if computer is in 1218 normal mode.
 - Set bit 16 if computer is in 1218 NTDS mode.
 - Set bit 15 if computer is in 1219 normal mode.
- h. Insert (if necessary) the plug-in printed wiring assembly 7104010 in the location specified as follows:
 - A4ALJ5G if computer is in 1218 normal mode.
 - A4ALJ5F if computer is in 1218 NTDS mode.
 - A4ALJ4G if computer is in 1219 normal mode.
- i. Set P=10300.
- j. Start the computer.

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PROGRAM DATA PAGE**SPECIFICATION SHEET**

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REVISION -

SPECIFICATION SYMBOL
SB-10163

TITLE: ARITH - 1219B ARITHMETIC TEST

DECK IDENTIFIER: FACT

CSP LABEL: ARITH KEY: IS LABEL DUPLICATE? No

PROGRAMMER: HWM modified by TLR DATE: 8 December 1967

NUMBER OF L OUTPUT INSTRUCTIONS: 51

DESCRIPTION:

This routine, ARITH, monitors the arithmetic test.

This routine is referenced by the Main Executive routine when ARITH is run as part of the integrated Command, Arithmetic, and Control Memory tests. When run as a separate program ARITH is referenced by routine EXEC.

When ARITH is entered, PROGRAM SKIP 4 is referenced. If set, typeouts are suppressed, and subroutine EXEC is return jumped to. This procedure continues until PROGRAM STOP 1 is set to end the test. If PROGRAM SKIP 4 is not set ARITHMETIC TEST is typed and EXEC is return jumped to. Upon the return from EXEC the cycle count is incremented and compared to a number N stored in address NYMB. If N cycles are completed an error flag is checked. If no errors occurred END CYCLES is typed. If errors occurred RECYCLE is typed. After these typeouts PROGRAM STOP 1 is referenced to end the test. Then PROGRAM SKIP 2 is referenced. If set an exit is made from ARITH to the Main Executive program. If not set the process of counting N test cycles is repeated.

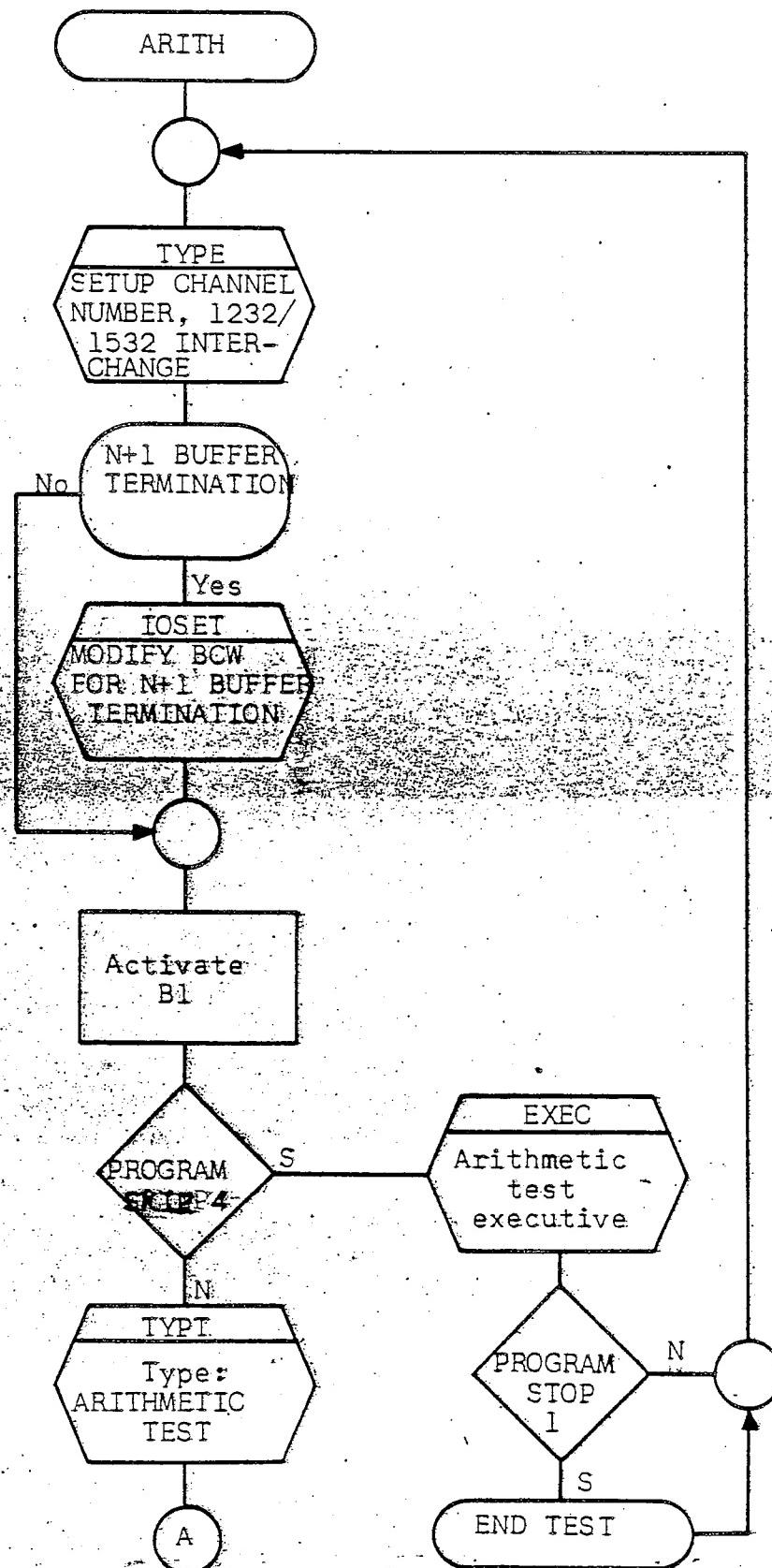
SPECIFICATION SYMBOL
SB-10163**TITLE:** ARITH - 1219B ARITHMETIC TEST**INPUT PARAMETERS (Listed Sequentially):**

EFLG - error flag

OUTPUT PARAMETERS (Listed Sequentially):

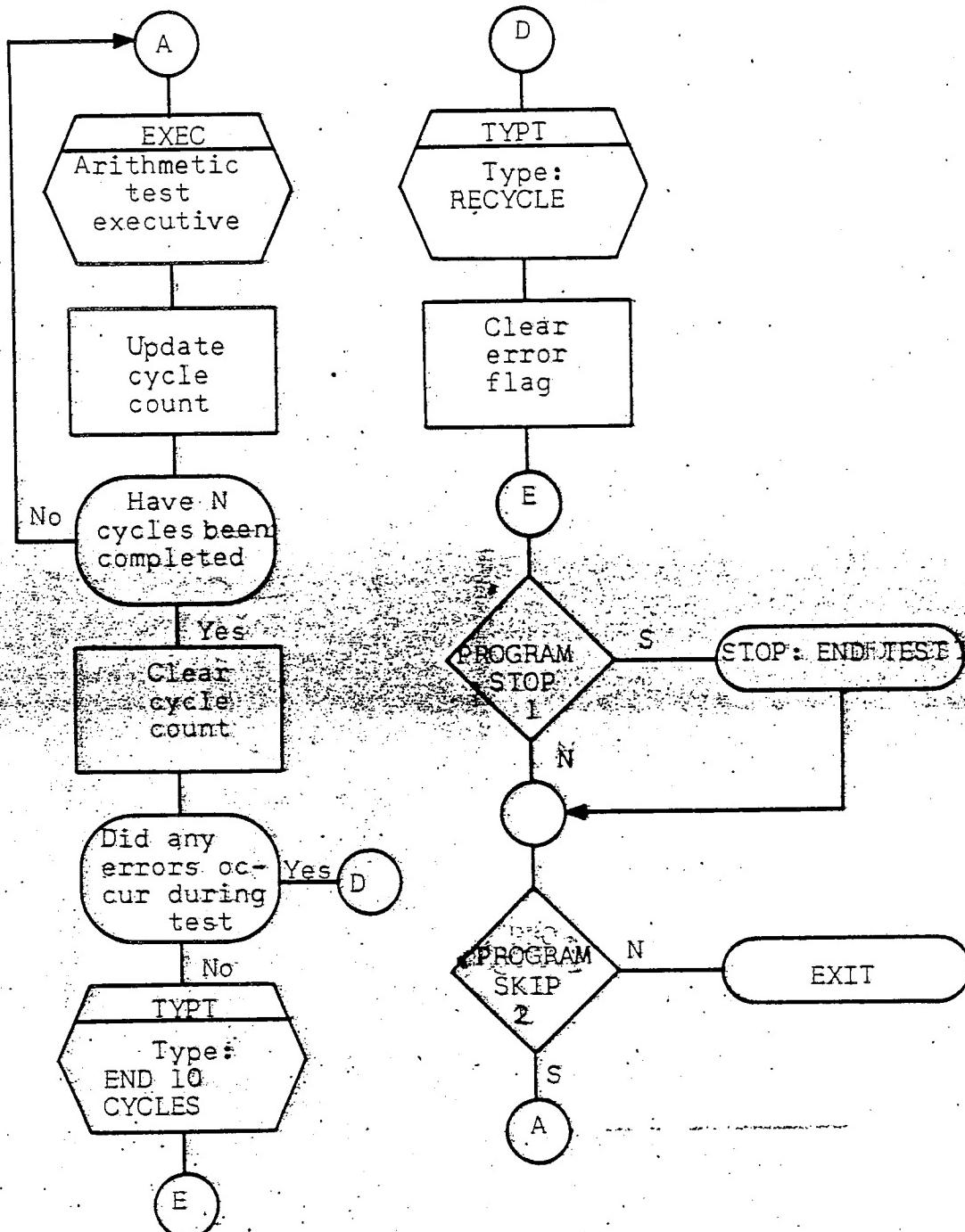
Buffers

NAME - NAME1+3
END - END+5
BUN - BUN+3**ABNORMAL EXITS (Listed Sequentially):****NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys or Duplicate Labels Specified):**EXEC
MEXEC
TYPE
IOSET**SYSTEM DATA REFERENCES:****ALARMS AND/OR REMARKS:**PROGRAM SKIP 4 - Set to suppress typeouts
Not set for typeoutsPROGRAM STOP 1 - Set to end test
Not set to continuePROGRAM SKIP 2 - Set to remain in ARITH
Not set to exit from ARITH



ARITH - 1219B
ARITHMETIC TEST

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ARITH - 1219B ARITHMETIC TEST

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PROGRAM DATA PAGE**SPECIFICATION SHEET**

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SPECIFICATION SYMBOL
SB-10163

TITLE: ERMSG - ERROR TYPEOUT

DECK IDENTIFIER: FACT

CS-1 LABEL: ERMSG KEY: IS LABEL DUPLICATE? No

PROGRAMMER: HWM modified by TLR DATE: 8 December 1967

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 43**DESCRIPTION:**

This subroutine, ERMSG, types out the error indication if PROGRAM SKIP 4 is not set.

This routine is referenced by each of the tests within the ARITHMETIC TEST.

When ERMSG is entered subroutine MTITLE is referenced to print the title of the failing test. Then, if the test is not a divide test, title of the failing test is printed. If the test is a divide test, the values "ERROR" and "INCORRECT" are typed.

is typed by referencing subroutine TYPT. Then the correct and incorrect values are typed below the appropriate headers. If the test is a divide test only the "correct" and "incorrect" values corresponding to AU and AL are typed. After the typeouts, PROGRAM STOP 2 is referenced to stop the tests. If not set an exit is made from ERMSG.

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SPECIFICATION SYMBOL
SB-10163

TITLE: ERMSG - ERROR TYPEOUT

INPUT PARAMETERS (Listed Sequentially):

PTN 1
PTN 2

OUTPUT PARAMETERS (Listed Sequentially):

Buffers: ERR - ERR 2++ 5
BUN + 2

PTN 1
PTN 2

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

MTITLE
TYPT

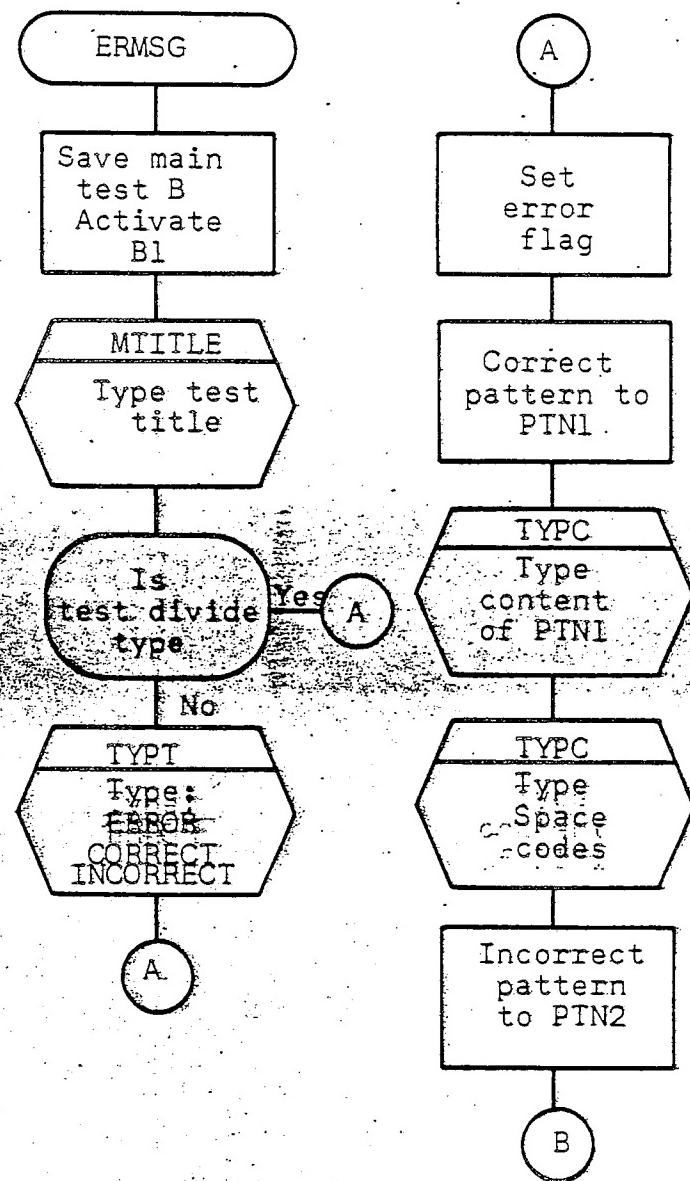
SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

PROGRAM STOP 2 - Set to stop after typeout.
Not set to continue tests..

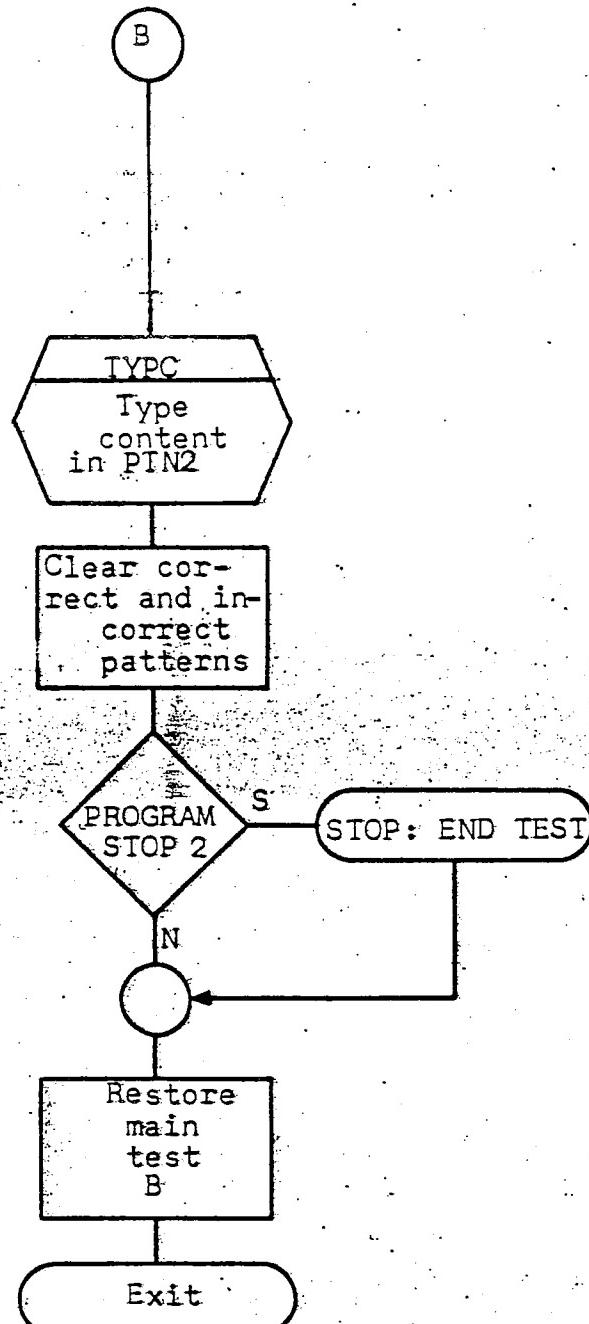
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ERMSG - ERROR TYPEOUT

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ERMSG -

ERROR TYPEOUT

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SPECIFICATION SYMBOL
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TITLE: TYPE - SETUP CHANNEL NUMBER, 1232/1532 INTERCHANGE

DECK IDENTIFIER: FACT

CS-1 LABEL: TYPE KEY: IS LABEL DUPLICATE? No

PROGRAMMER: TLR DATE: 8 December 1967

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 43**DESCRIPTION:**

This subroutine inserts the 1232/1532 channel number in all I/O instructions. It also modifies the TYPT and TYPC subroutines so as to accept either 1232 or 1532 coded data.

SPECIFICATION SYMBOL
SB-10163

TITLE: _____ TYPE _____

INPUT PARAMETERS (Listed Sequentially):

ALPARAM - Initial AL input parameter

OUTPUT PARAMETERS (Listed Sequentially):

T\$1 T\$\$1 } I/O instructions with channel number inserted
T\$2 T\$\$2 }
T\$3 T\$\$3 } I/O instructions with channel number inserted
T\$4 T\$\$4 }

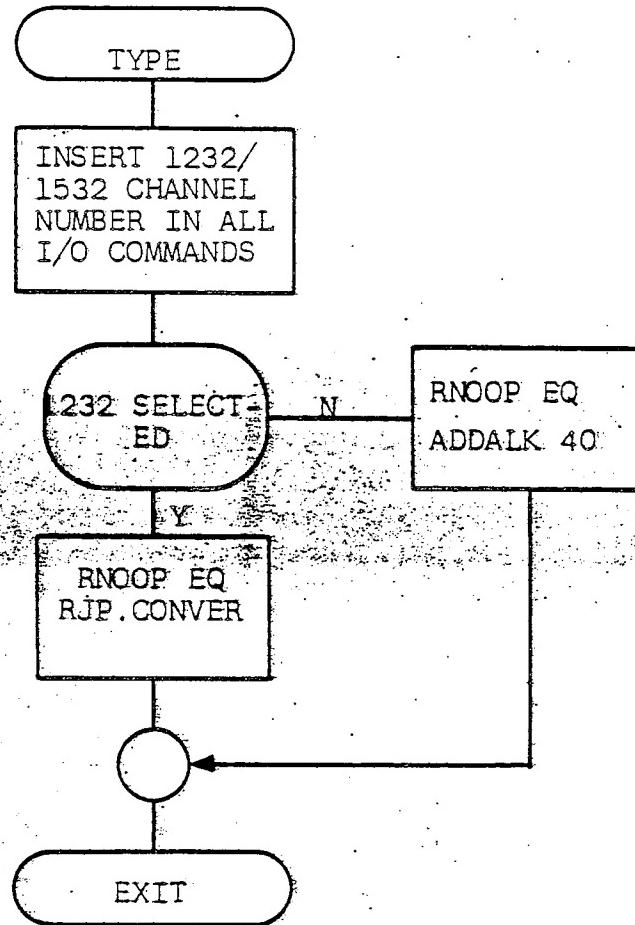
RNOOP } RPPCONVER if 1232 selected
 } ADDALK-40 if 1532 selected

ABNORMAL EXITS (Listed Sequentially):**NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):****SYSTEM DATA REFERENCES:****ALARMS AND/OR REMARKS:**

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SPECIFICATION SYMBOL
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TITLE: IOSET

DECK IDENTIFIER: IOSET

CS-1 LABEL: IOSET KEY: IS LABEL DUPLICATE? No

PROGRAMMER: TLR DATE: 8 December 1967

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 14**DESCRIPTION:**

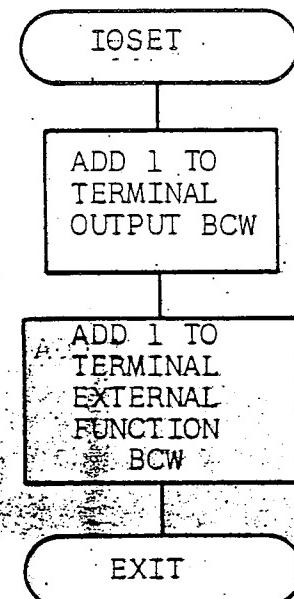
This subroutine modifies output and external function buffers for N+1 termination.

SPECIFICATION SYMBOL
SB-10163TITLE: IOSET**INPUT PARAMETERS (Listed Sequentially):**T\$1+2
T\$2+2**OUTPUT PARAMETERS (Listed Sequentially):**T\$1+1
T\$2+1**ABNORMAL EXITS (Listed Sequentially):****NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):****SYSTEM DATA REFERENCES:****ALARMS AND/OR REMARKS:**

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SPECIFICATION SYMBOL
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TITLE: MTITLE - TYPE TEST TITLE

DECK IDENTIFIER: FACT

CS-1 LABEL: MTITLE **KEY:** _____ **IS LABEL DUPLICATE?** No

PROGRAMMER: HWM modified by JLR **DATE:** 8 December 1967

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 54

DESCRIPTION:

This subroutine, MTITLE, types the title of the tests that fail during the Arithmetic test.

This subroutine is referenced by subroutine ERMSG.

When MTITLE is entered error flags are checked to determine the failing test, then the test title is typed and an exit is made to ERMSG.

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SPECIFICATION SYMBOL
SB-10163TITLE: MITLE - TYPE TEST TITLE

INPUT PARAMETERS (Listed Sequentially):

The error flags FLAG - FLAG+12

OUTPUT PARAMETERS (Listed Sequentially):

Test titles

TAUT - TDVT

ABNORMAL EXITS (Listed Sequentially):

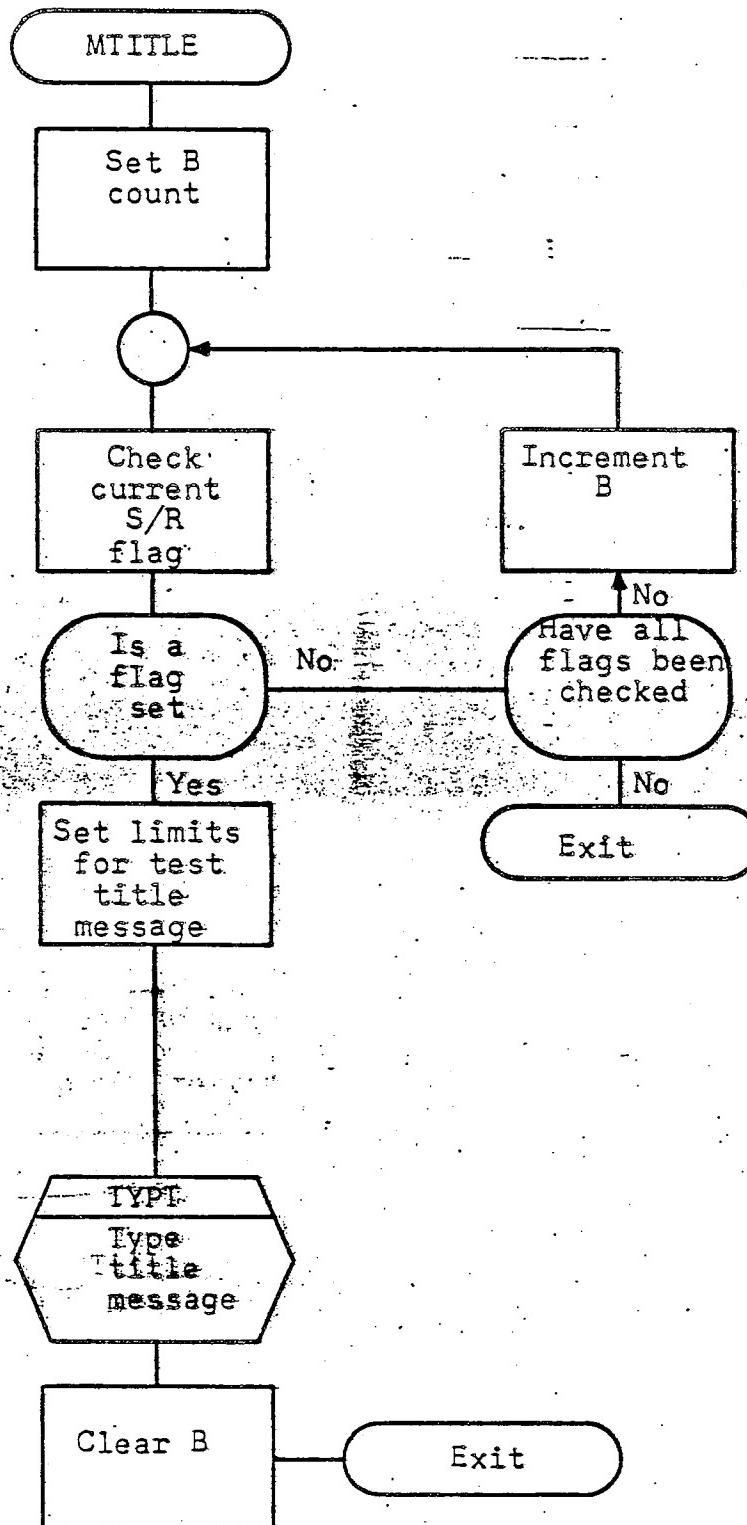
NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys or Duplicate Labels Specified):

TYPT

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

SPECIFICATION SYMBOL
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MTITLE - TYPE S/R TITLE

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SPECIFICATION SYMBOL
SB-10163TITLE: EXEC - ARITHMETIC TEST EXECUTIVEDECK IDENTIFIER: FACTCS-1 LABEL: EXEC KEY: _____ IS LABEL DUPLICATE? NoPROGRAMMER: HWM modified by TLR DATE: 8 December 1967NUMBER OF L₄ OUTPUT INSTRUCTIONS: 82**DESCRIPTION:**

This subroutine, EXEC, controls the testing portion of the Arithmetic test through a series of return jumps. There are 11 different arithmetic subroutine tests that can be run sequentially or individually by the use of various PROGRAM SKIP settings.

This subroutine is referenced by routine ARITH.

EXEC is entered from ARITH, and return jumps to the various test subroutines. Upon returning to EXEC after a test subroutine PROGRAM SKIP 0 is referenced. If set the test subroutine just run will be entered again. If not set the next sequential test subroutine will be entered. After all test subroutines have been run PROGRAM SKIP 1 is referenced. If set control is returned to ARITH. If not set the series of test subroutines will be run through again. Before each test subroutine is entered a title flag is set. Upon returning the flag is cleared.

SPECIFICATION SYMBOL
SB-10163TITLE: EXEC - ARITHMETIC TEST EXECUTIVE

INPUT PARAMETERS (Listed Sequentially):

OUTPUT PARAMETERS (Listed Sequentially):

Title flags
FLAG thru FLAG+12

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys or Duplicate Labels Specified):

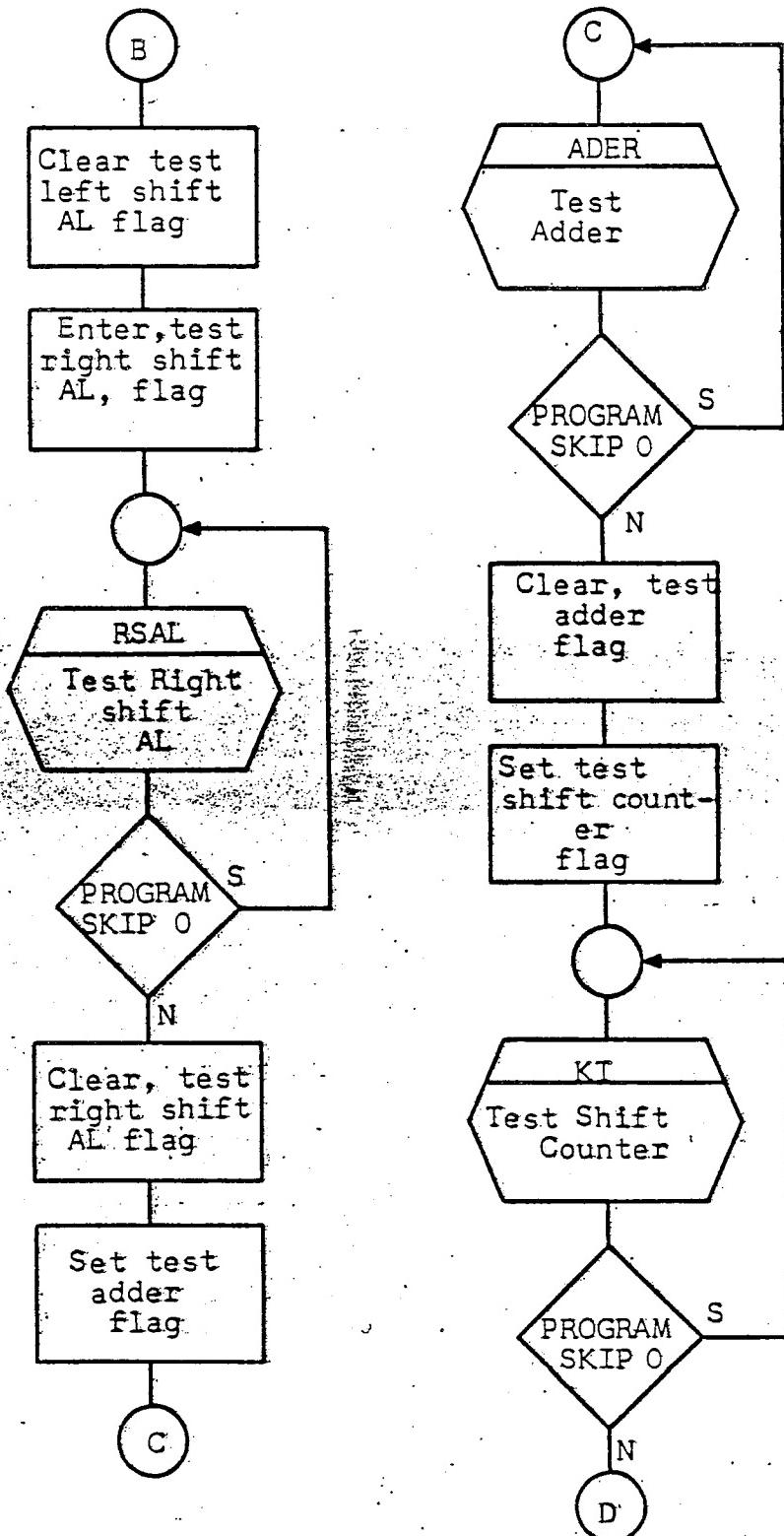
Test Subroutines:
AUT, ALT, LSAL, RSAL, ADER, KT,
CPAL, ADD, MUL, DIV, and DVT

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

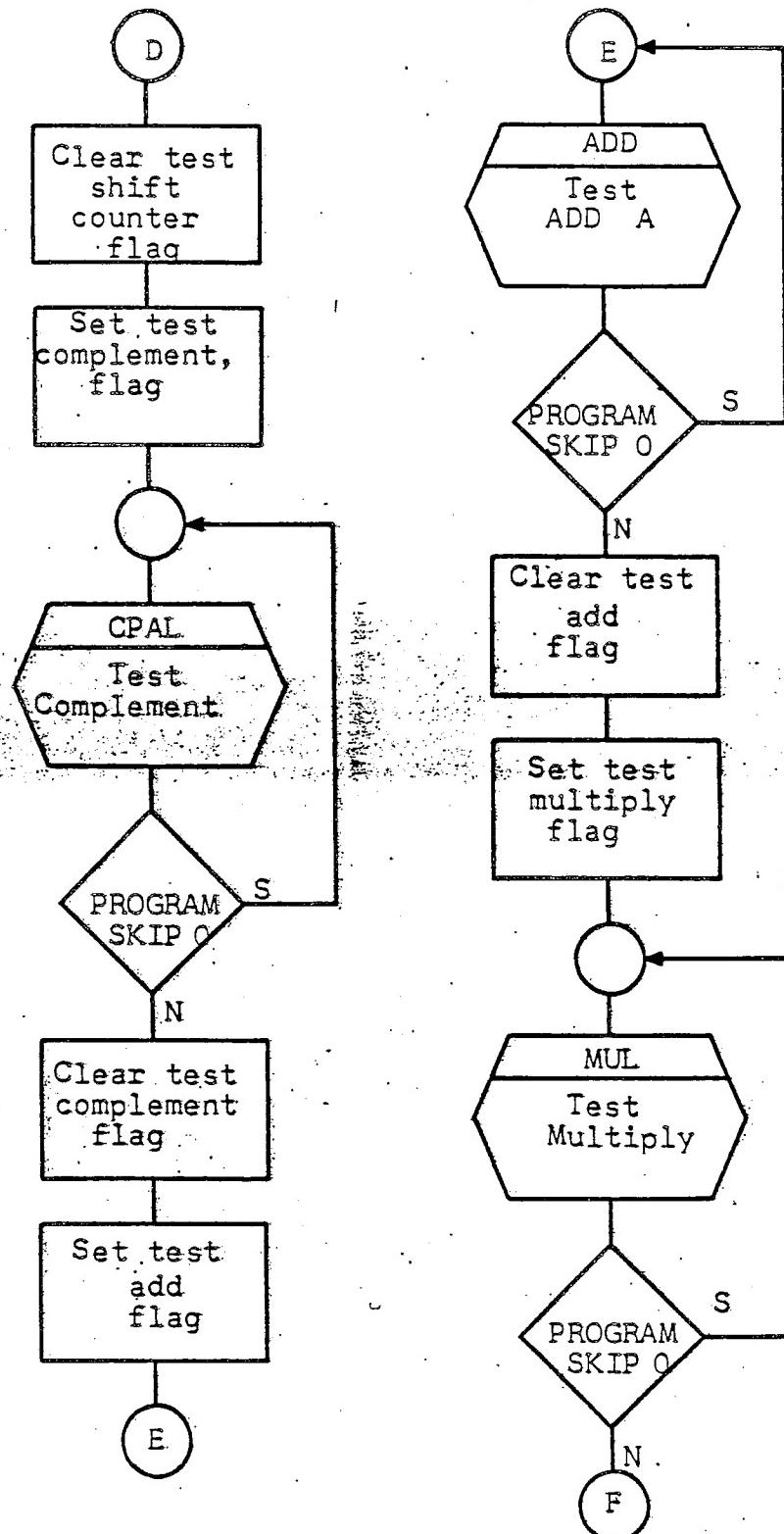
PROGRAM SKIP 0 - Set to recycle a test subroutine
Not set to enter next sequential test subroutinePROGRAM SKIP 1 - Set to return control to ARITH
Not set to remain in EXEC.

SPECIFICATION SYMBOL
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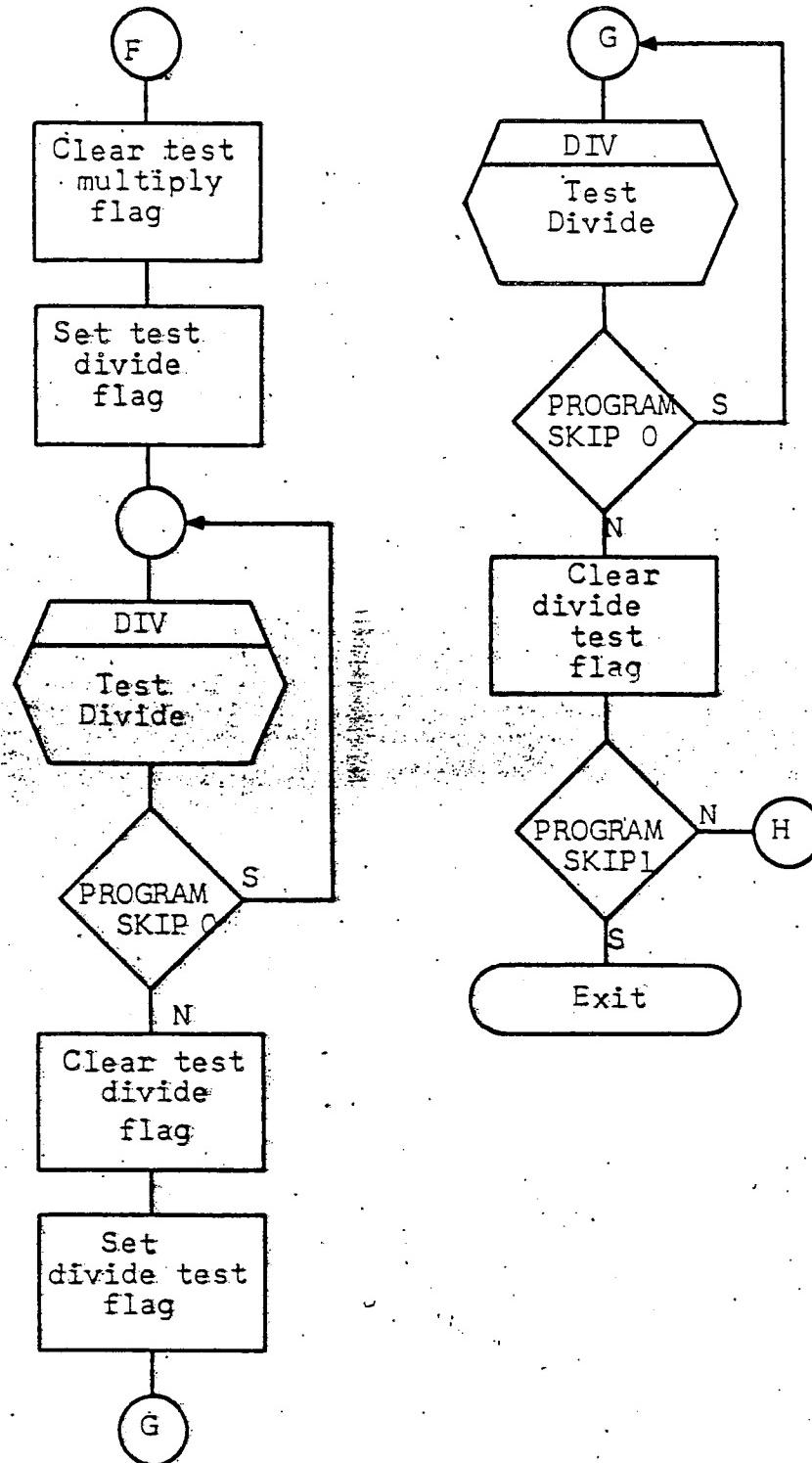
EXEC - ARITHMETIC TEST EXECUTIVE

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EXEC - ARITHMETIC TEST EXECUTIVE

SPECIFICATION SYMBOL
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EXEC - ARITHMETIC TEST EXECUTIVE

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SPECIFICATION SYMBOL
SB-10163

TITLE: AUT - TEST AU REGISTER

DECK IDENTIFIER: FACT

CS-1 LABEL: AUT KEY: IS LABEL DUPLICATE? No

PROGRAMMER: HWM modified by TLR DATE: 8 December 1967

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 39

DESCRIPTION:

This subroutine, AUT, tests the AU Register by entering a pattern into this register, storing the contents at a common memory location, and entering this memory location into AL. Then it checks for an error by using a check table.

This subroutine is referenced by subroutine EXEC.

AUT goes through the entering-storing-entering process until an error occurs or the test is completed successfully. If an error occurs and PROGRAM STOP 0 is set and AU is equal to AL, the enter AU portion of this subroutine failed. If AU is not equal to AL, either the store AU or enter AL functions failed. Then PROGRAM SKIP 4 is referenced. If not set an error typeout occurs. If set an exit is made from AUT.

SPECIFICATION SYMBOL
SB-10163TITLE: AUT - TEST AU REGISTER**INPUT PARAMETERS (Listed Sequentially):**

IPAT1 = 000000
IPCK = WORKING STORAGE.
IPAT2 = 000000
IPAT1+1 = 777777
IPAT2+1 = 777777
IPAT1+2 = 252525
IPAT1+3 = 525252
IPAT1+4 = 707070
IPAT1+5 = 070707

OUTPUT PARAMETERS (Listed Sequentially):

PIN1
PIN2

ABNORMAL EXITS (Listed Sequentially):**NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):**

ERMSG

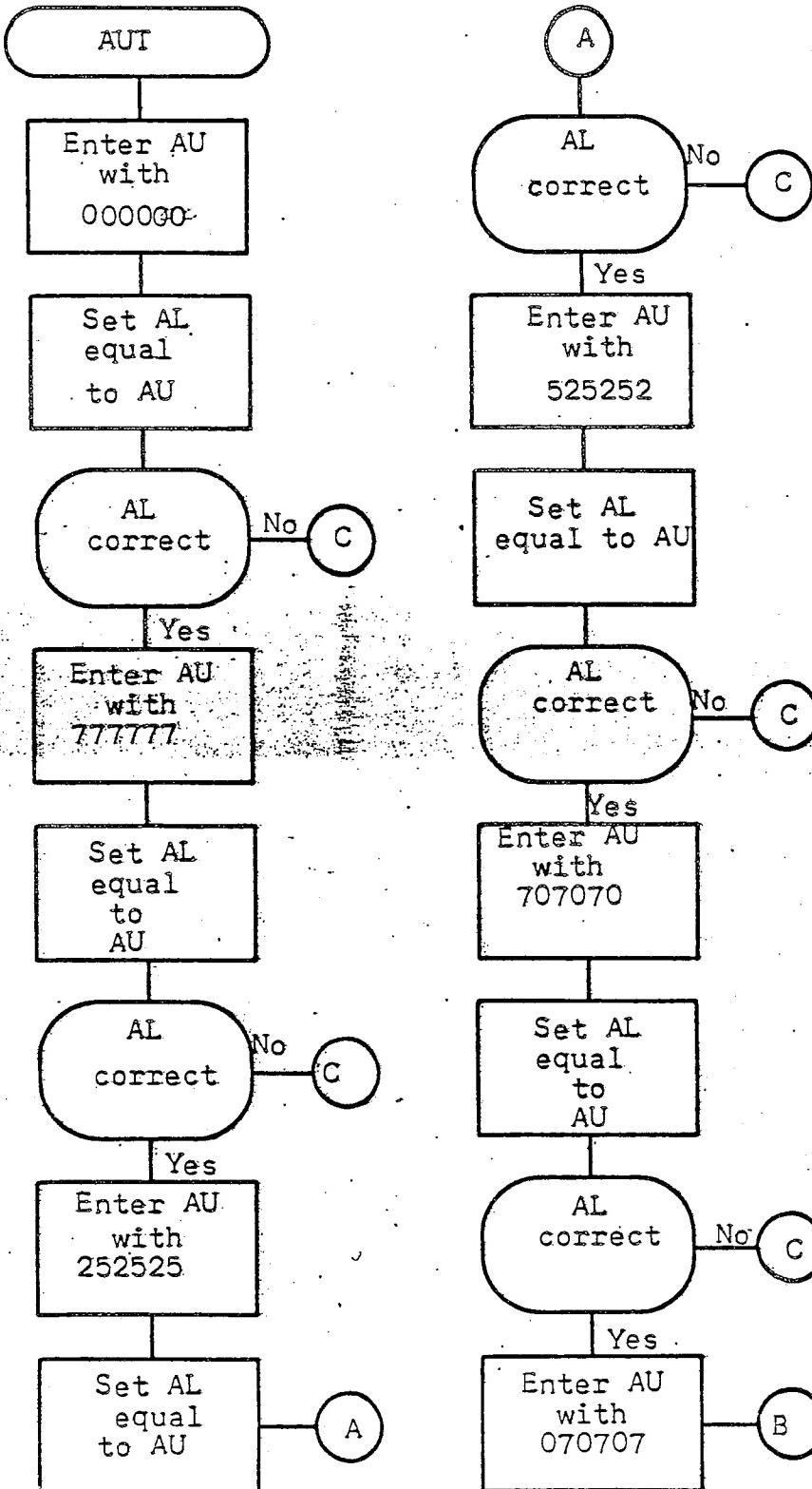
SYSTEM DATA REFERENCES:**ALARMS AND/OR REMARKS:**

PROGRAM SKIP 4 - Set to suppress error typeouts
Not set for error typeouts

PROGRAM STOP 0 - Set for computer console error display upon stop

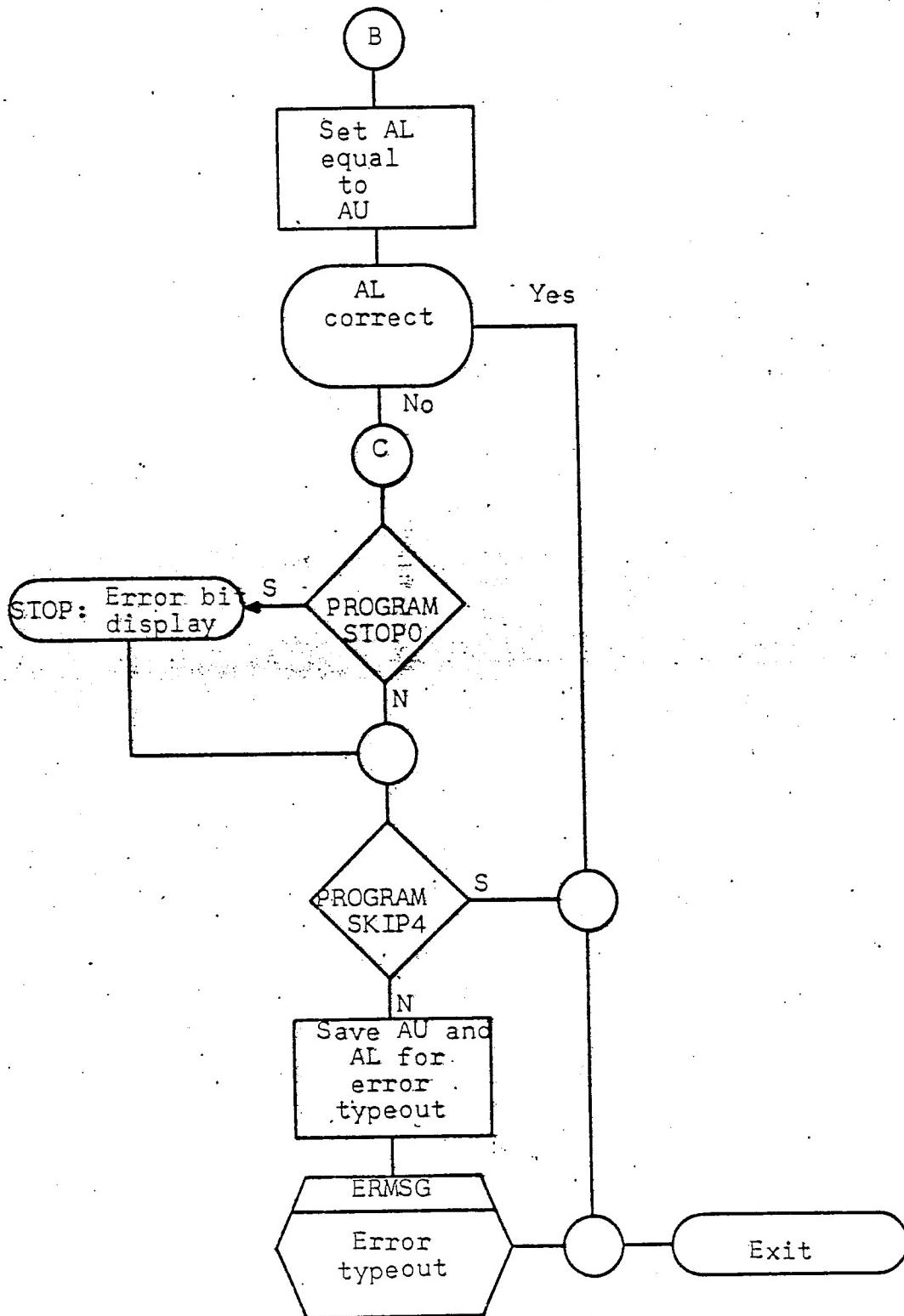
P = 10710
AU = Pattern entered into AU
AL = Pattern stored from AU

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AUT - TEST AU REGISTER

SPECIFICATION SYMBOL
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AUT - TEST AU REGISTER

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SPECIFICATION SYMBOL
SB-10163TITLE: ALT - TEST AL REGISTERDECK IDENTIFIER: FACTCS-T LABEL: ALT KEY: _____ IS LABEL DUPLICATE? NoPROGRAMMER: HWM modified by TLR DATE: 8 December 1967NUMBER OF L₄ OUTPUT INSTRUCTIONS: 32**DESCRIPTION:**

This subroutine, ALT, tests the AL register by entering a pattern into this register and checking its contents against a check table.

ALT is referenced by subroutine EXEC.

ALT goes through the entering-checking process until an error occurs or the test is completed successfully. If an error occurs PROGRAM STOP 0 is referenced. If set the computer stops with the correct in AU and incorrect in AL. If not set or upon restarting PROGRAM SKIP 4 is referenced. If set an exit is made from ALT. If not set an error typeout occurs, then an exit is made from ALT.

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SPECIFICATION SYMBOL
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TITLE: ALT - TEST AL REGISTER

INPUT PARAMETERS (Listed Sequentially):

TPAT1 = 000000	TPAT1+5 = 070707
TPAT1+1 = 777777	TPAT2+5 = 070707
TPAT2+1 = 777777	
TPAT1+2 = 252525	
TPAT2+2 = 252525	
TPAT1+3 = 525252	
TPAT2+3 = 525252	
TPAT1+4 = 707070	
TPAT2+4 = 707070	

OUTPUT PARAMETERS (Listed Sequentially):

PTN1
PTN2

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

ERMSG

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

PROGRAM SKIP 4 - Set to suppress error typeouts
Not set for error typeouts

PROGRAM STOP 0 - Set for computer console error display upon stop:
P = 10750

AU = correct pattern

AL = incorrect pattern

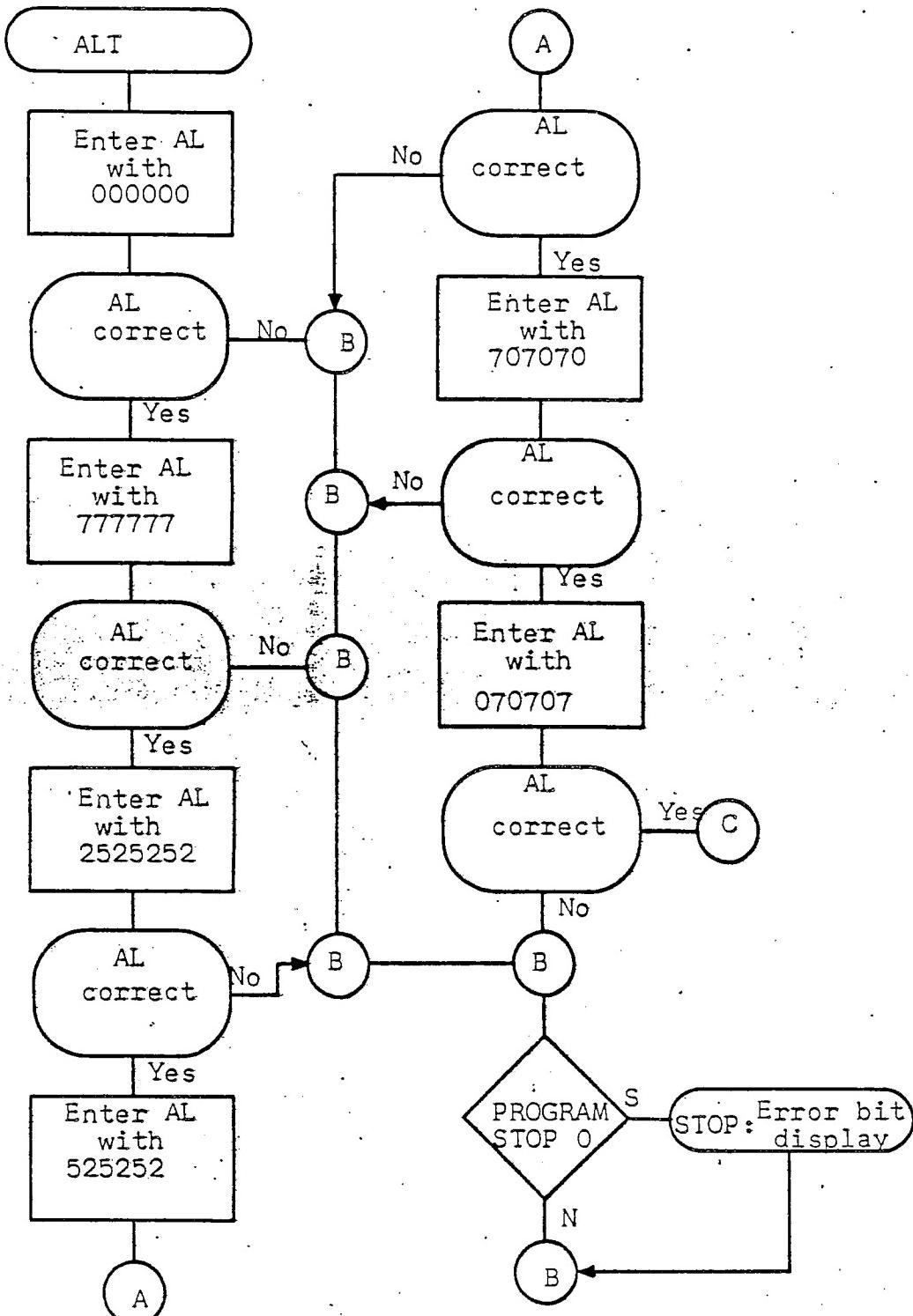
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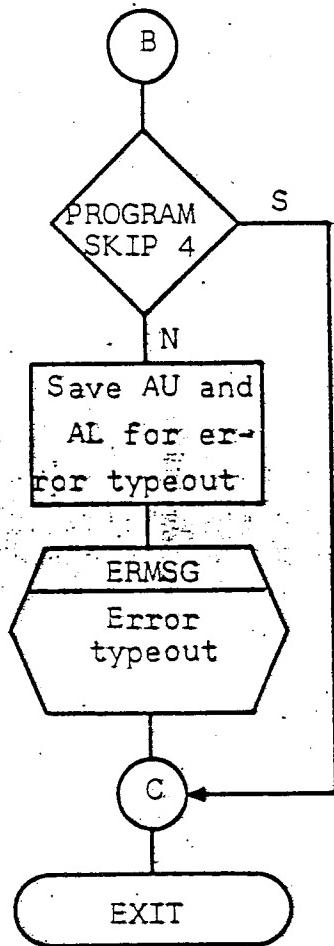
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ALT - TEST AL REGISTER

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ALT - TEST AL REGISTER

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SPECIFICATION SYMBOL
SB-10163TITLE: LSAL - LEFT SHIFT AU, AL, AND ADECK IDENTIFIER: FACTCS-1 LABEL: LSAL KEY: _____ IS LABEL DUPLICATE? NoPROGRAMMER: HWM modified by TLR DATE: 8 December 1967NUMBER OF L₄ OUTPUT INSTRUCTIONS: 87**DESCRIPTION:**

This subroutine, LSAL, tests the left shift capabilities of the registers. The AL Register is tested first by loading various patterns, shifting, and verifying. The AU Register is tested next, using similar patterns, and finally the A Register is tested.

LSAL is referenced by subroutine EXEC.

The three portions of this subroutine are run sequentially. Upon successful completion control is returned to EXEC after the A register is tested. If an error occurs PROGRAM STOP 0 is referenced. If set the computer stops with an error display in AU and AL. If not set or upon restarting PROGRAM SKIP 4 is referenced. If not set an error typeout occurs. If set or after the typeout the next sequential portion of LSAL is run. However, if the error occurs in the test A portion an exit is made to EXEC.

TITLE: LSAL - LEFT SHIFT AU, AL, AND A**INPUT PARAMETERS (Listed Sequentially):**

TPAT1 = 000000
TPAT2 = 000000
TPAT1+1 = 777777
TPAT2+1 = 777777
TPAT1+2 = 252525
TPAT2+3 = 525252
TPAT2+2 = 252525
TPAT1+4 = 707070
TPAT2+5 = 070707
TPAT2+4 = 707070

OUTPUT PARAMETERS (Listed Sequentially):

PTN1
PTN2

ABNORMAL EXITS (Listed Sequentially):**NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):**

ERMSG

SYSTEM DATA REFERENCES:**ALARMS AND/OR REMARKS:**

PROGRAM SKIP 4 - Set to suppress error typeouts
Not set for error typeouts

PROGRAM STOP 0 - Set for computer console error display upon stop:
P = 11014

AU = correct pattern

AL = incorrect pattern

P = 11045

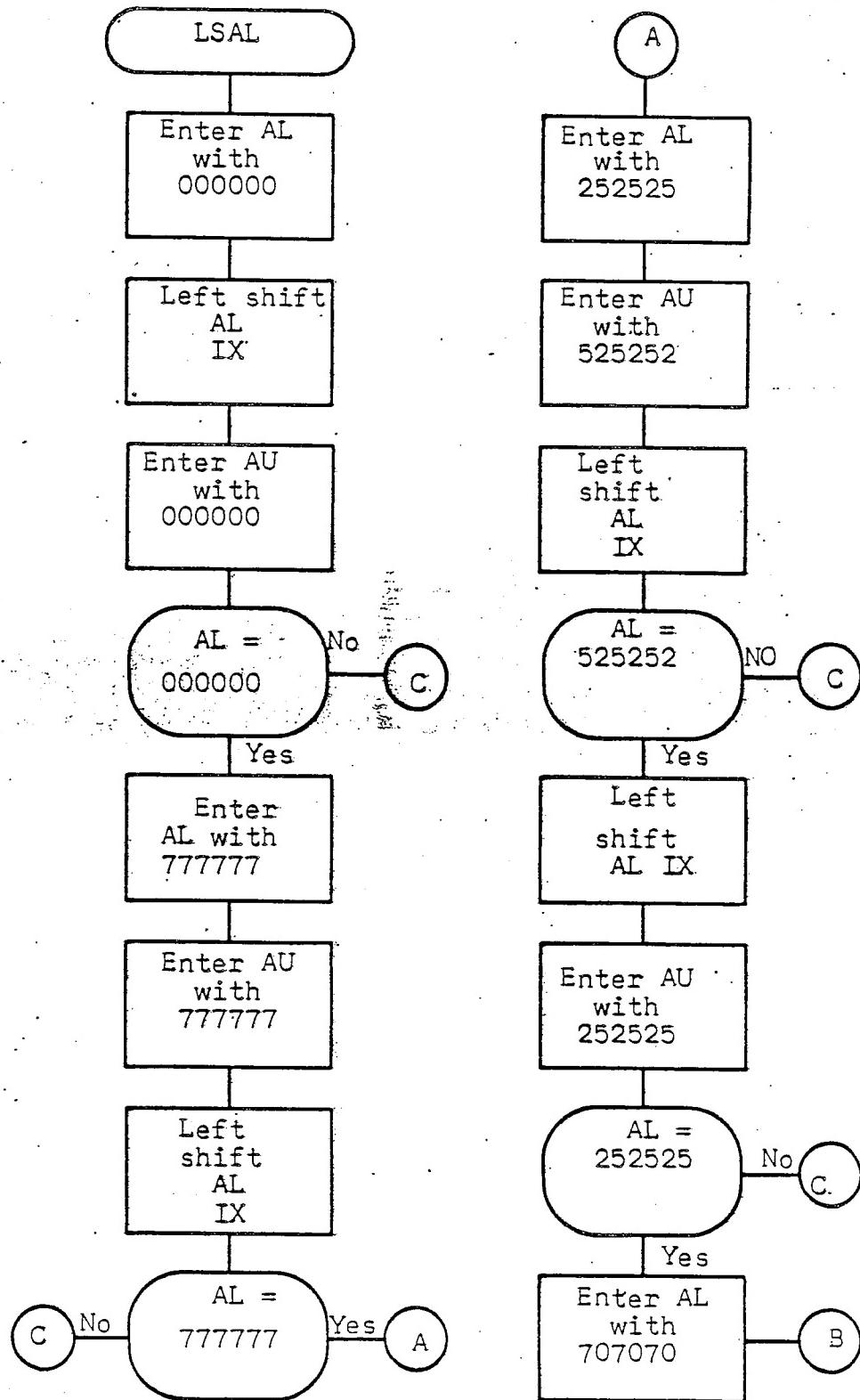
AU = incorrect pattern

AL = correct pattern

P = 11076

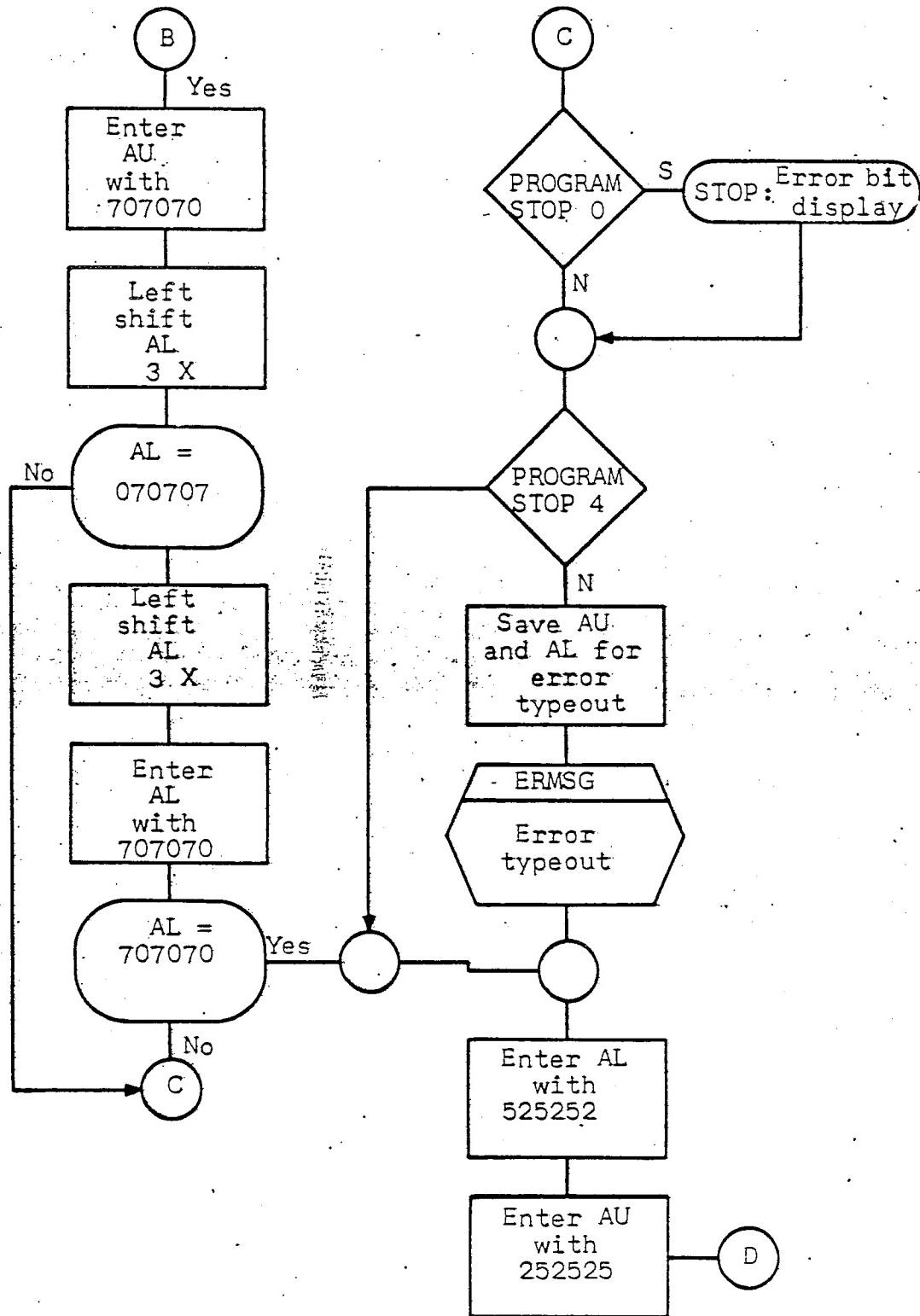
AU and AL should be equal

SPECIFICATION SYMBOL
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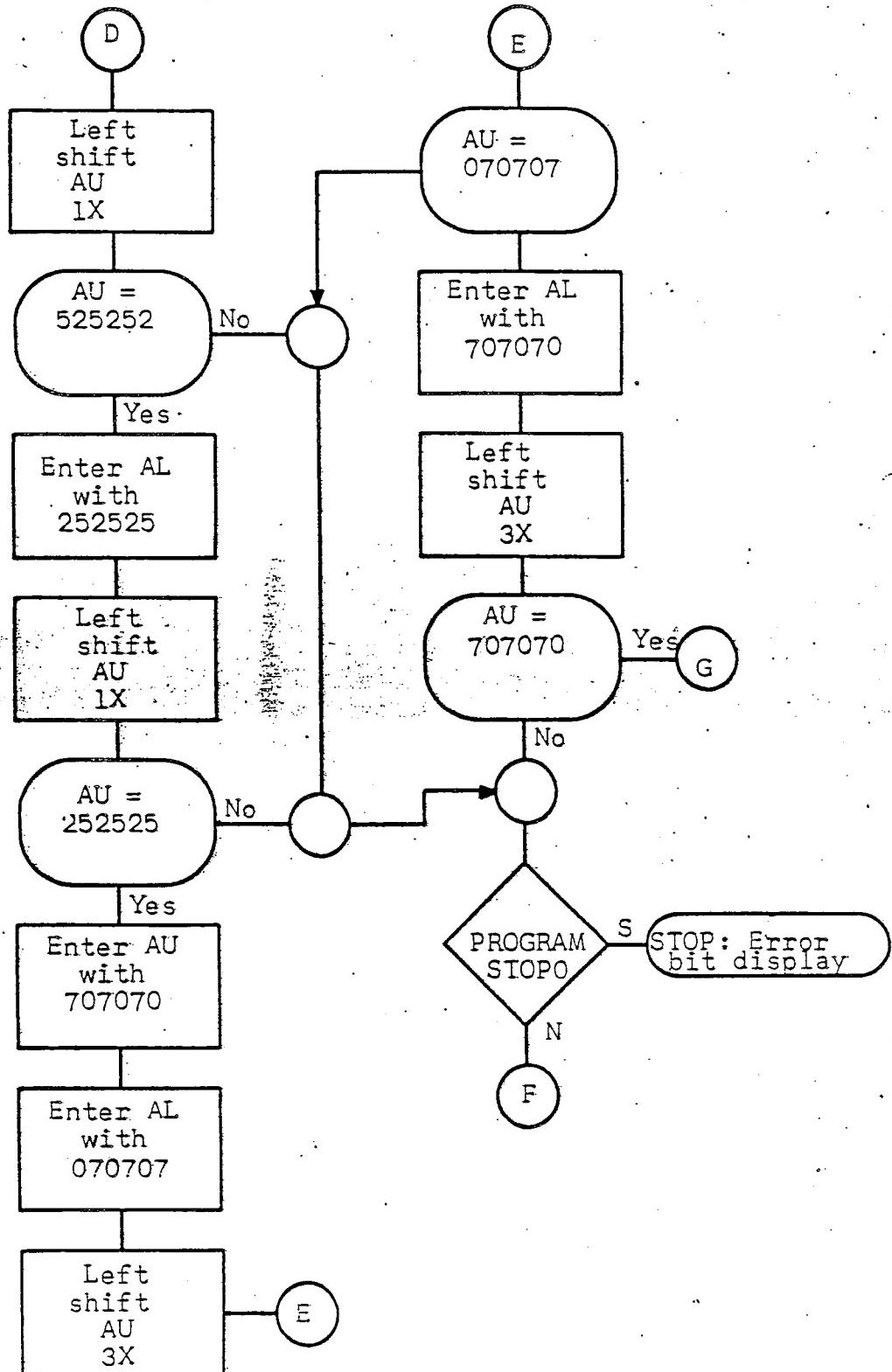
LSAL - LEFT SHIFT AU, AL & A.

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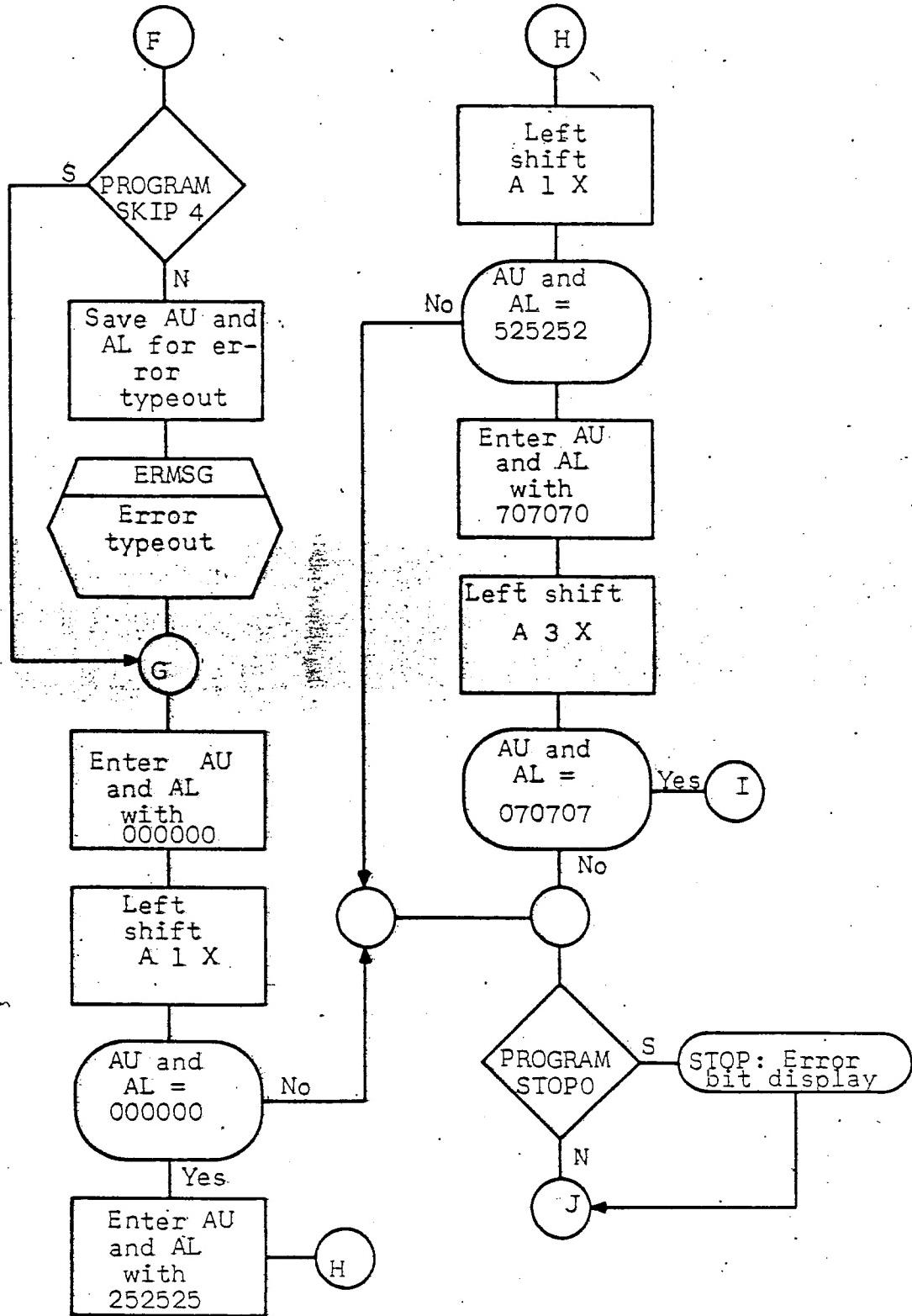
LSAL - LEFT SHIFT AU, AL & A

SPECIFICATION SYMBOL
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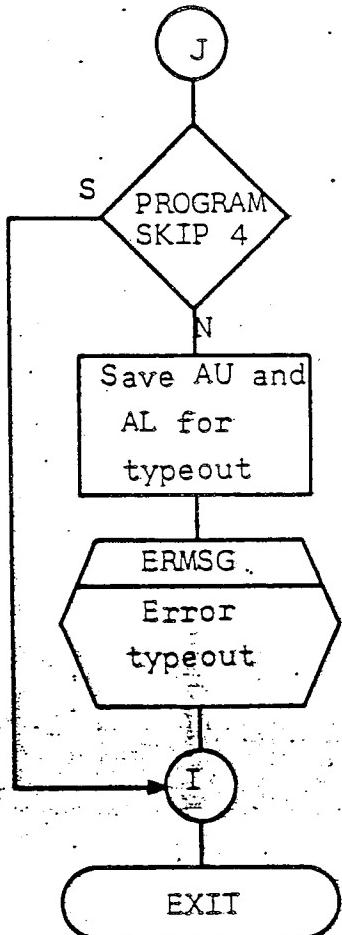
LSAL - LEFT SHIFT AU, AL & A

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LSAL - LEFT SHIFT AU, AL & A

SPECIFICATION SYMBOL
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LSAL - LEFT SHIFT AU, AL & A

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SPECIFICATION SYMBOL
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TITLE: RSAL - RIGHT SHIFT AL, AU, AND A

DECK IDENTIFIER: FACT

CS-1 LABEL: RSAL KEY: IS LABEL DUPLICATE? No

PROGRAMMER: HWM modified by TLR DATE: 8 December 1967

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 91

DESCRIPTION:

This subroutine, RSAL, tests the right shift capabilities of the registers. The AL Register is tested first by loading various patterns, shifting, and verifying. The AU Register is tested next, using similar patterns, and finally the A Register is tested.

RSAL is referenced by subroutine EXEC.

The three portions of this subroutine are run sequentially. Upon successful completion control is returned to EXEC after the A register is tested. If an error occurs PROGRAM STOP 0 is referenced. If set the computer stops with an error display in AU and AL. If not set or upon restarting PROGRAM SKIP 4 is referenced. If not set an error typeout occurs. If set or after the typeout the next sequential portion of RSAL is run. However, if the error occurs in the test A portion an exit is made to EXEC.

SPECIFICATION SYMBOL
SB-10163TITLE: RSAL - RIGHT SHIFT AL, AU, AND A

INPUT PARAMETERS (Listed Sequentially):

TPAT1 = 000000
TPAT1+1 = 777777
TPAT3 = 125252
TPAT1+2 = 252525
TPAT3+1 = 652525
TPAT1+3 = 525252
TPAT2+3 = 525252
TPAT2+2 = 252525

OUTPUT PARAMETERS (Listed Sequentially):

PTN1
PTN2

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

ERMSG

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

PROGRAM SKIP 4 - Set to suppress error typeouts
Not set for error typeouts

PROGRAM STOP 0 - Set for computer console error display upon stop:
P = 11132

AU = correct pattern

AL = incorrect pattern

P = 11164

AU = incorrect pattern

AL = correct pattern

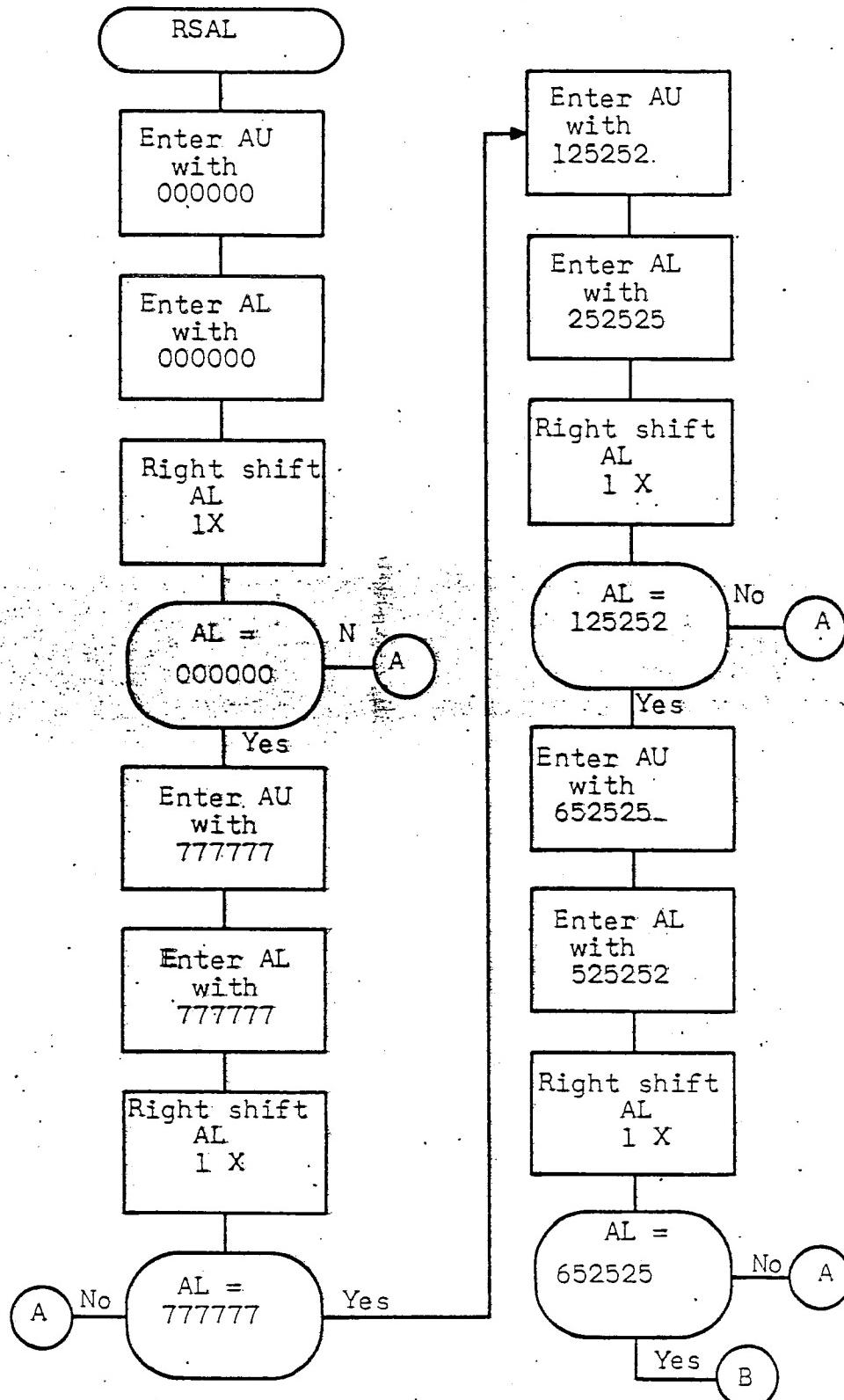
P = 11230

AU and AL = shifted pattern

SHEET 586

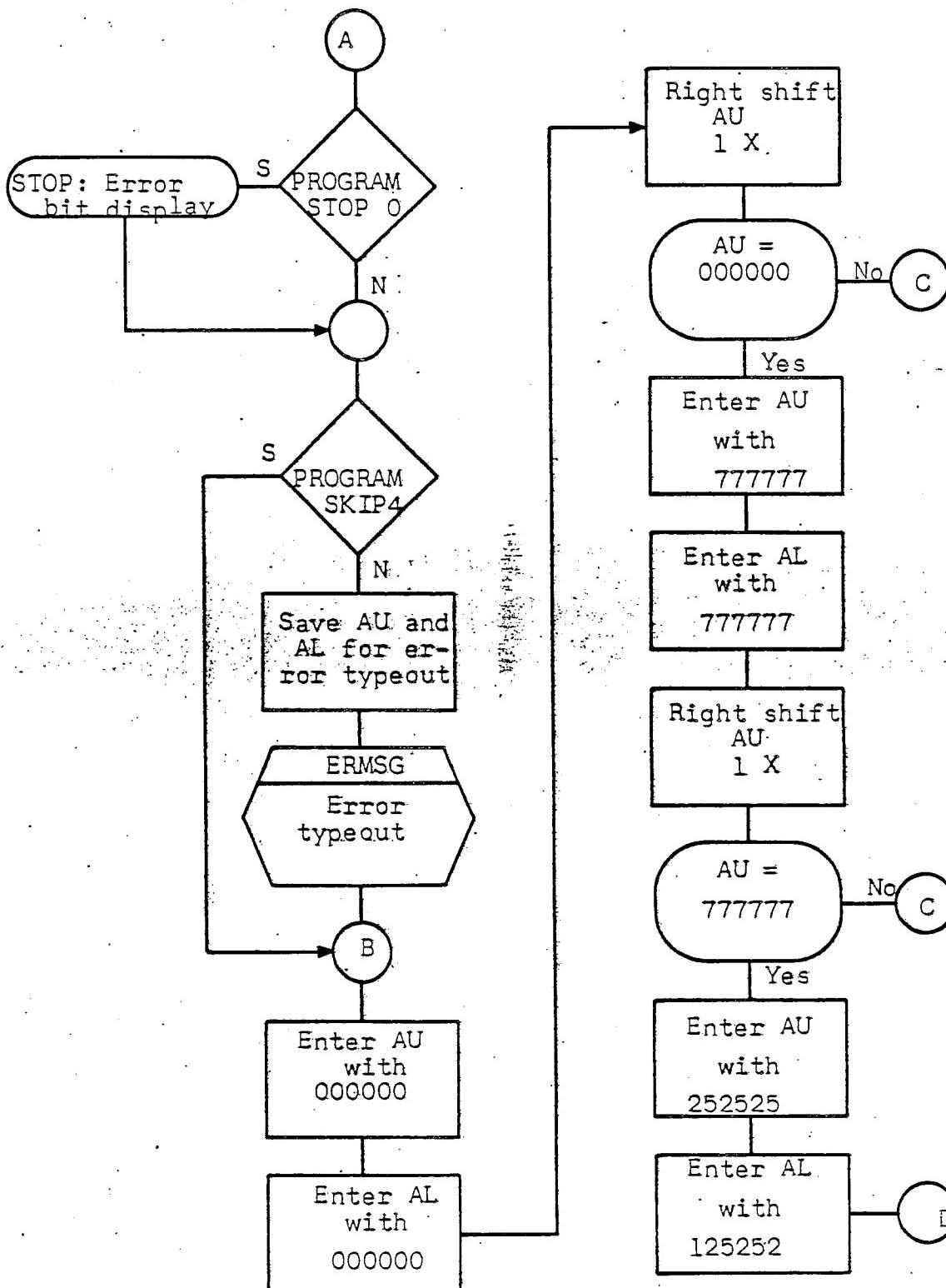
REVISION

SPECIFICATION SYMBOL
SB-10163

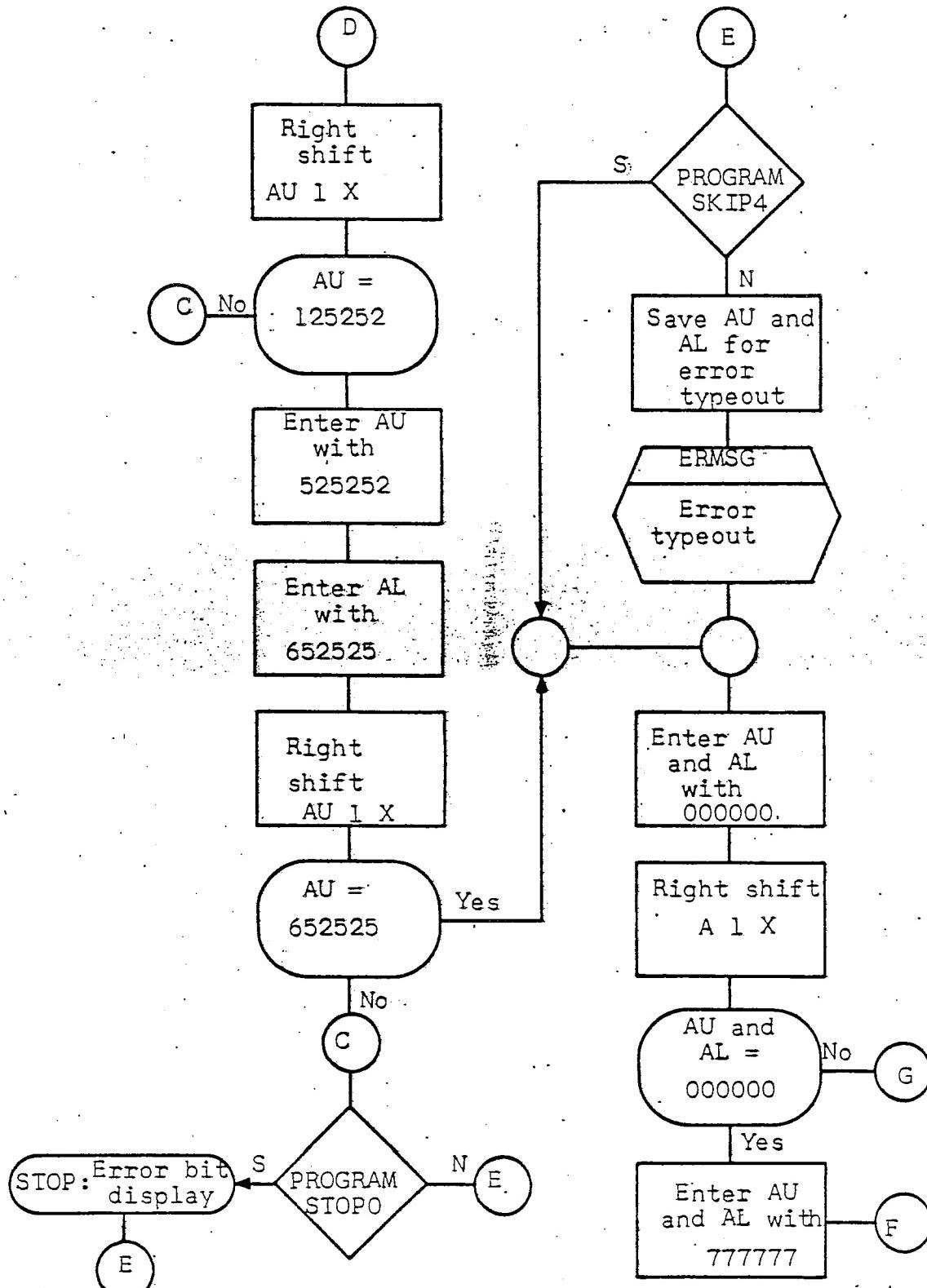


RSAL - RIGHT SHIFT AL, AU, & A

SPECIFICATION SYMBOL
SB-10163

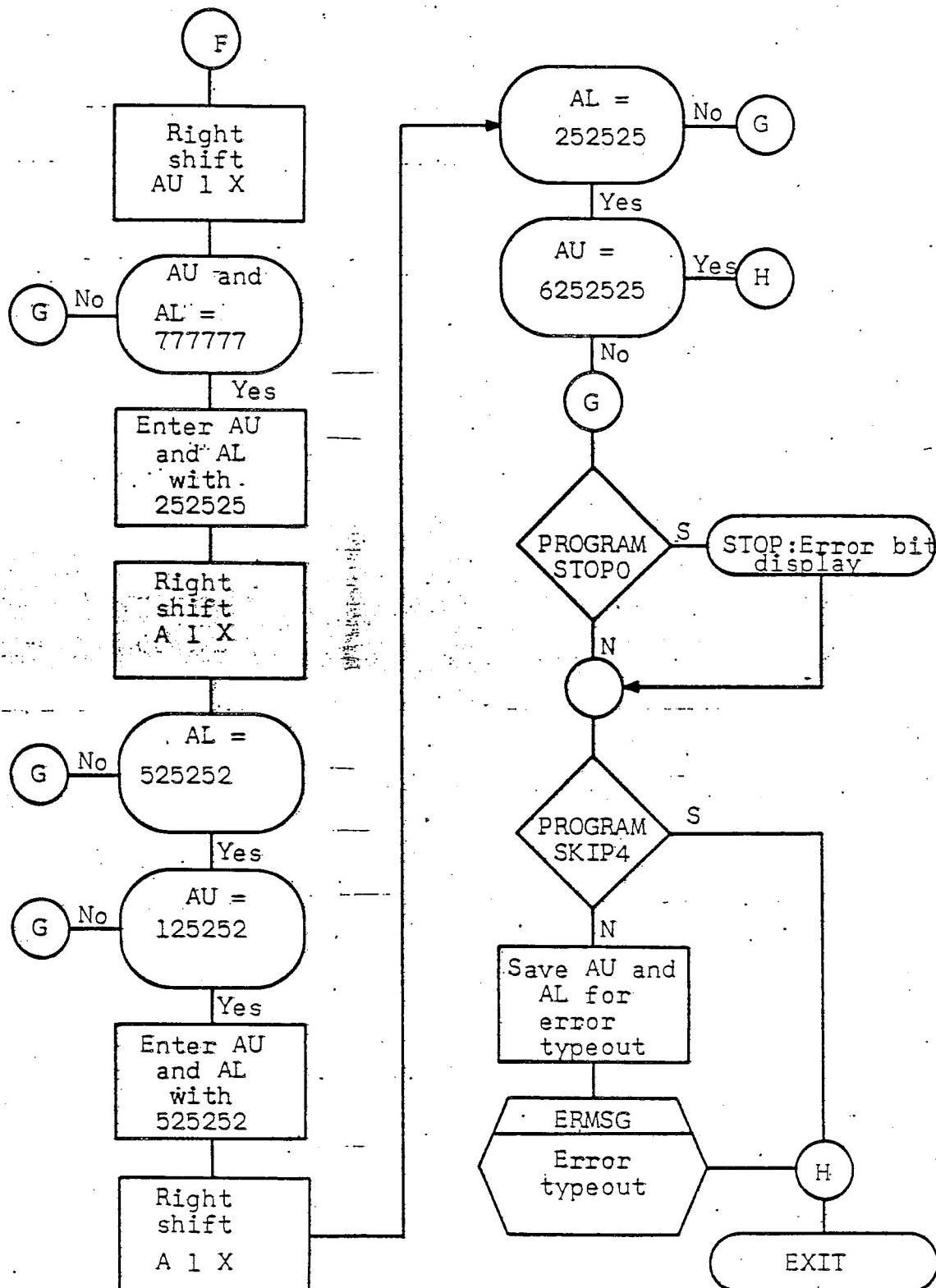


RSAL - RIGHT SHIFT AL, AU & A.



RSAL - RIGHT SHIFT AL, AU & A

SPECIFICATION SYMBOL
SB-10163



RSAL - RIGHT SHIFT AL, AU & A

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PROGRAM DATA PAGE**SPECIFICATION SHEET**

SHEET 590

REVISION

SPECIFICATION SYMBOL
SB-10163.TITLE: ADER - ADDER TESTDECK IDENTIFIER: FACTCS-1 LABEL: ADER KEY: IS LABEL DUPLICATE? NoPROGRAMMER: HWM modified by ILR DATE: 8 December 1967NUMBER OF L₄ OUTPUT INSTRUCTIONS: 134**DESCRIPTION:**

This subroutine, ADER, exercises the Adder. First a series of selective complements is performed then two series of patterns are shifted through, added, and the answers verified. ADER is referenced by subroutine EXEC.

During the series of selective complements AL is selective complemented and checked. If an error occurs PROGRAM STOP 0 is referenced. If set an error display occurs on the computer console. If not set, or upon restarting, PROGRAM SKIP 4 is referenced. If not set an error typeout occurs. If set, or after the typeout, the first of the add tests is entered. During the first of the add tests two numbers are left shifted by one, added together, and checked. If an error occurs an error display similar to the one above occurs. Then the second add test is entered. During the second add test two tables are shifted, added together, and the result is checked. If an error occurs an error display similar to the one above. However, for this portion of the test there is a second PROGRAM STOP 0. Upon the stop AU = 777777 and AL = N where N = 22- the number of shifts done on the tables that are added. The typeout corresponding to this portion of the error display is: ? X where X is equal to the number of shifts done on the tables that are added. After an error display or upon successful completion of the test an exit is made to EXEC.

SPECIFICATION SYMBOL
SB-10163TITLE: ADER - ADDER TEST**INPUT PARAMETERS (Listed Sequentially):**

TPAT1 = 000000	TAB3 = Table+B
TPAT1+1 = 777777	INDEX = 000021
TPAT1+2 = 252525	TAB4 = Table+B
TPAT1+3 = 525252	TAB5 = Storage Table+B
TPAT1+5 = 070707	INST1 = ENTAUB • TAB3
TPAT2+1 = 777777	INDEX2 = Working Index
TWD1 = 377777	INDEX1 = 000001
TWD2 = 377776	

SHWD1 = Working Storage
SHWD2 = Working Storage

OUTPUT PARAMETERS (Listed Sequentially):

PIN1
PIN2
Cycle count ADER 33 + X X = 0 - 228

ABNORMAL EXITS (Listed Sequentially):**NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):**

ERMSG
TYPAA

SYSTEM DATA REFERENCES:**ALARMS AND/OR REMARKS:**

PROGRAM SKIP 4 - Set to suppress

PROGRAM STOP 0 - Set for computer console error display upon stop:

P = 11263

AU = correct pattern

AL = incorrect pattern

P = 11371

AU = correct pattern

AL = incorrect pattern

P = 11401

AU = correct pattern

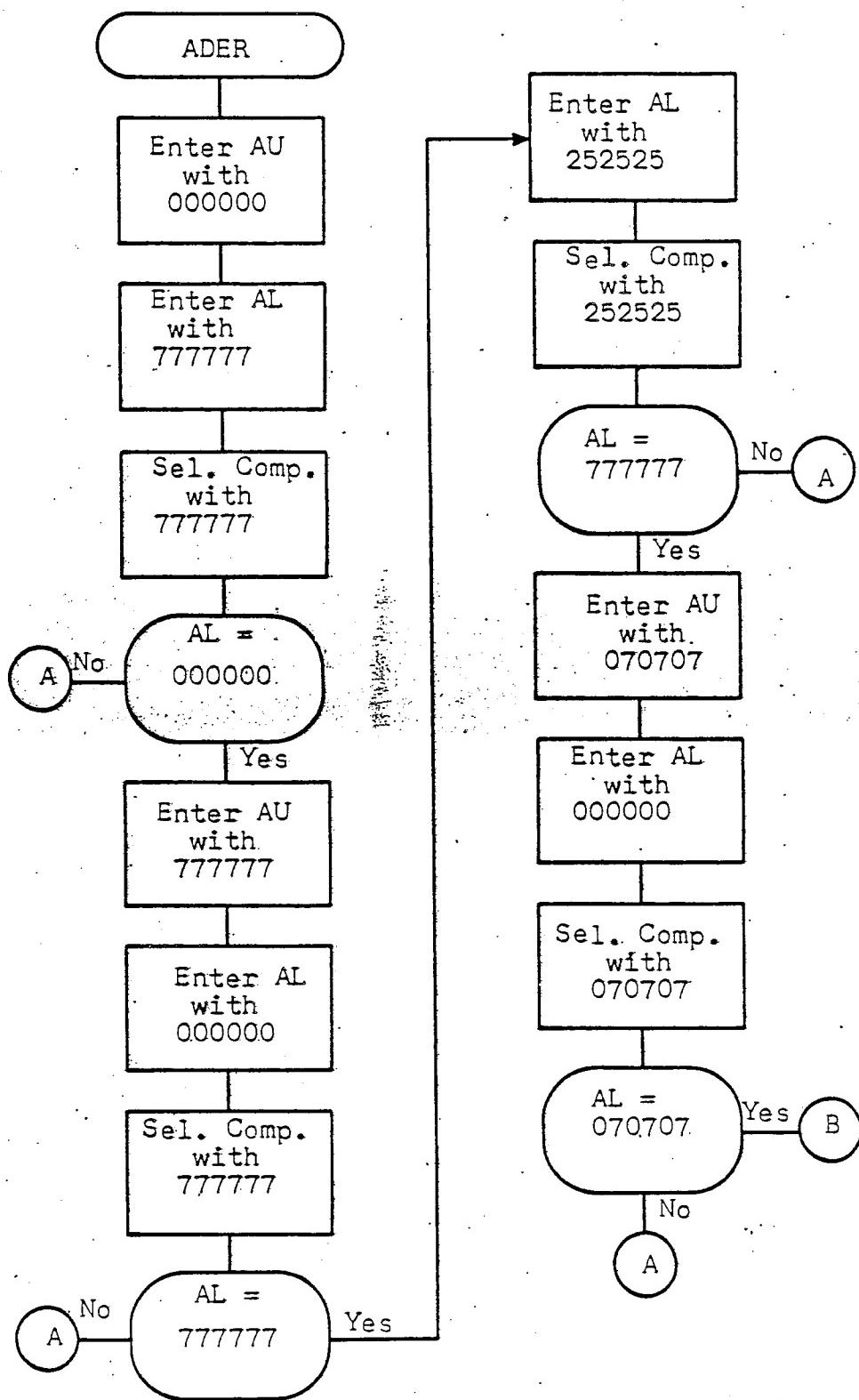
AL = correct pattern

P = 11407

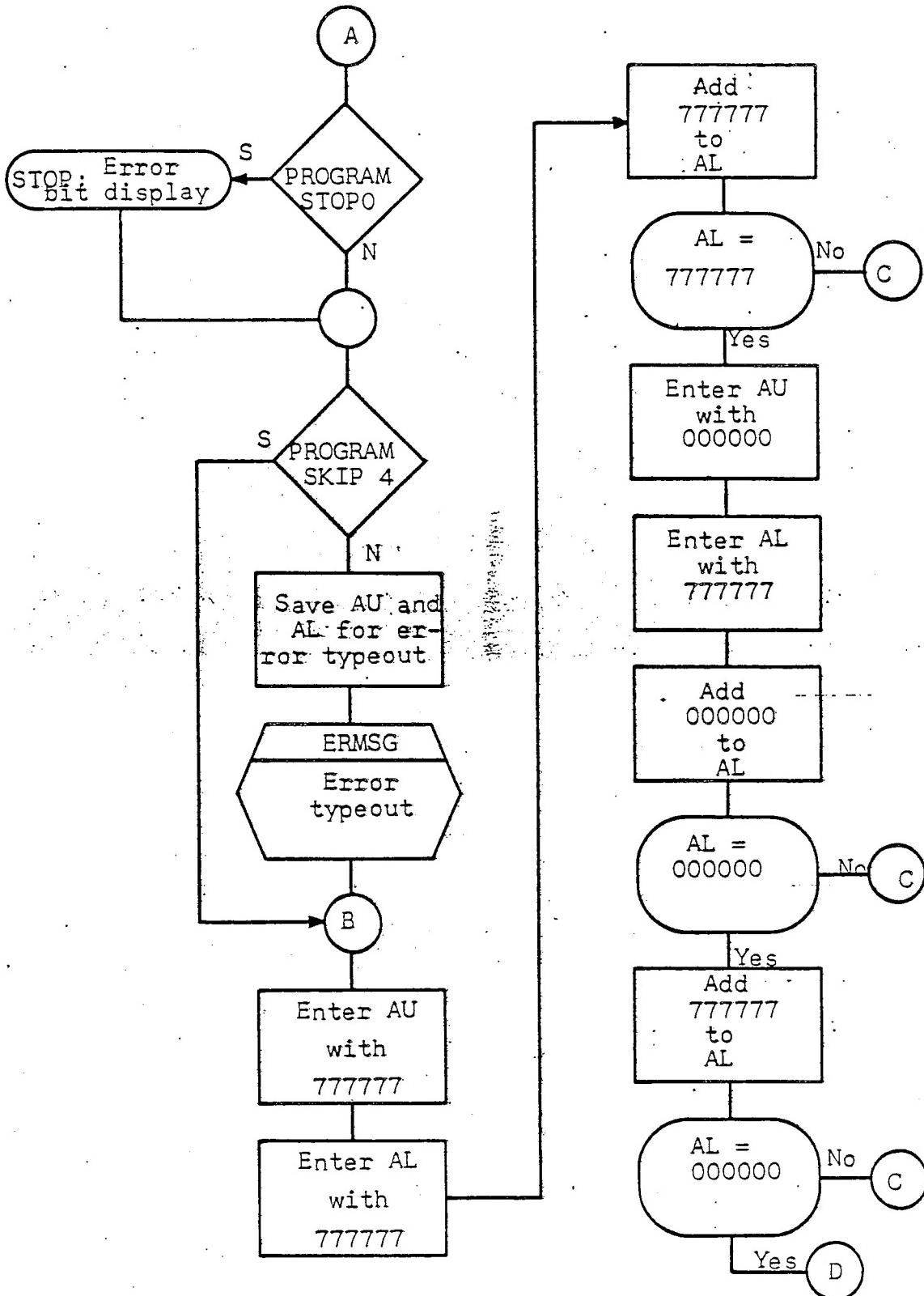
AU = 777777

AL = 22 - no. of shifts

SPECIFICATION SYMBOL
SB-10163

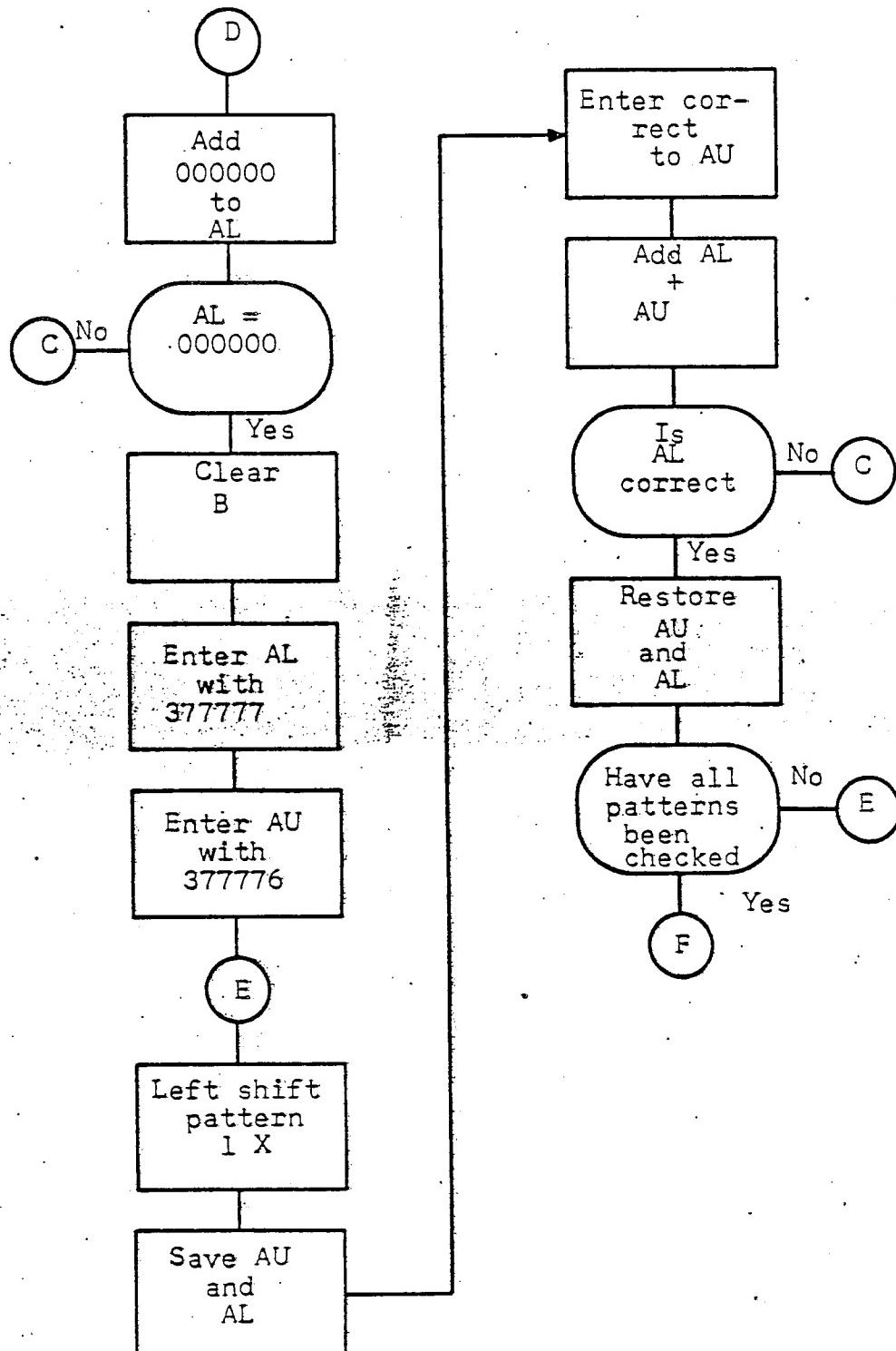


ADER - ADDER TEST



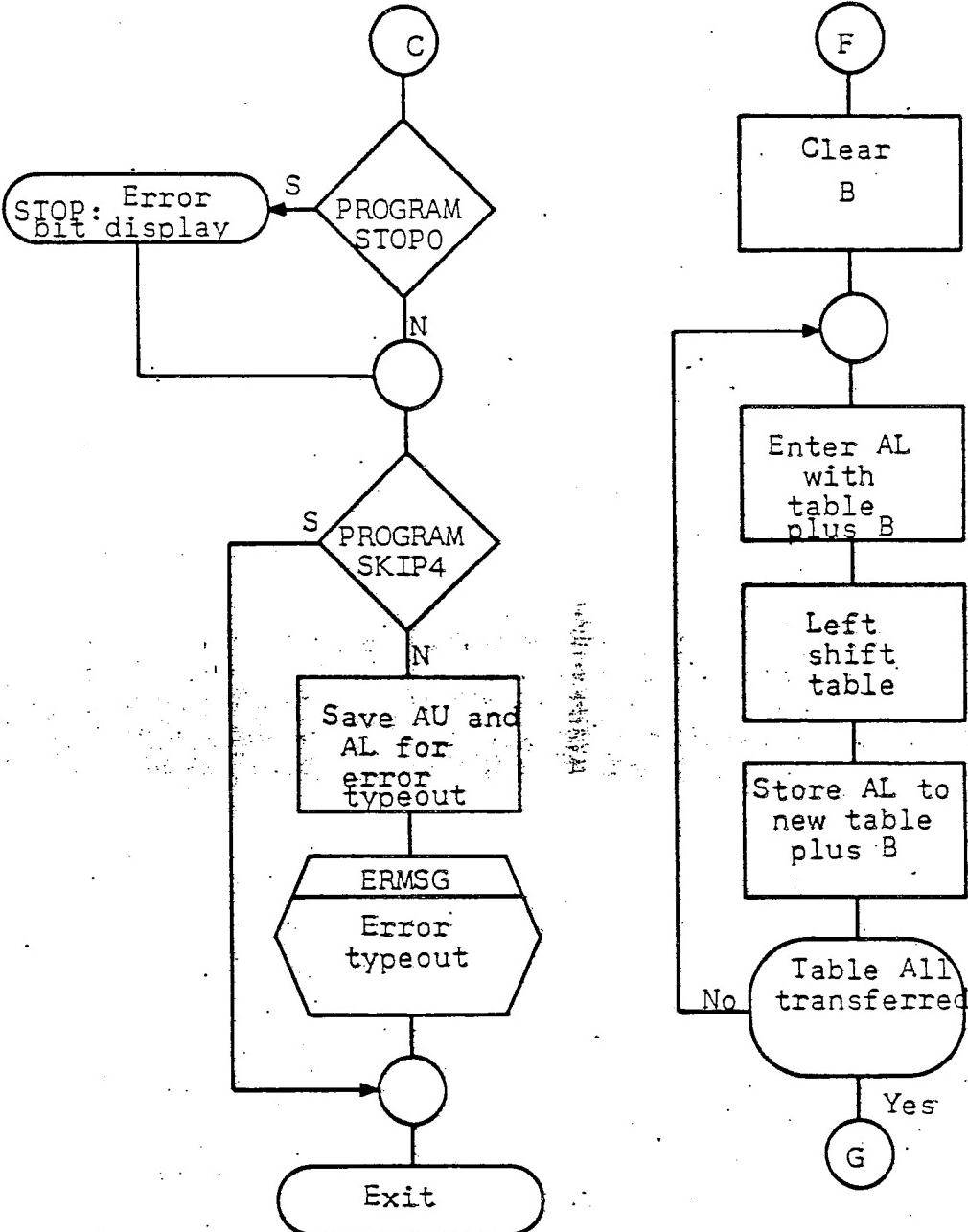
ADER - ADDER TEST

SPECIFICATION SYMBOL
SB-10163



ADER - ADDER TEST

SPECIFICATION SYMBOL
SB-10163

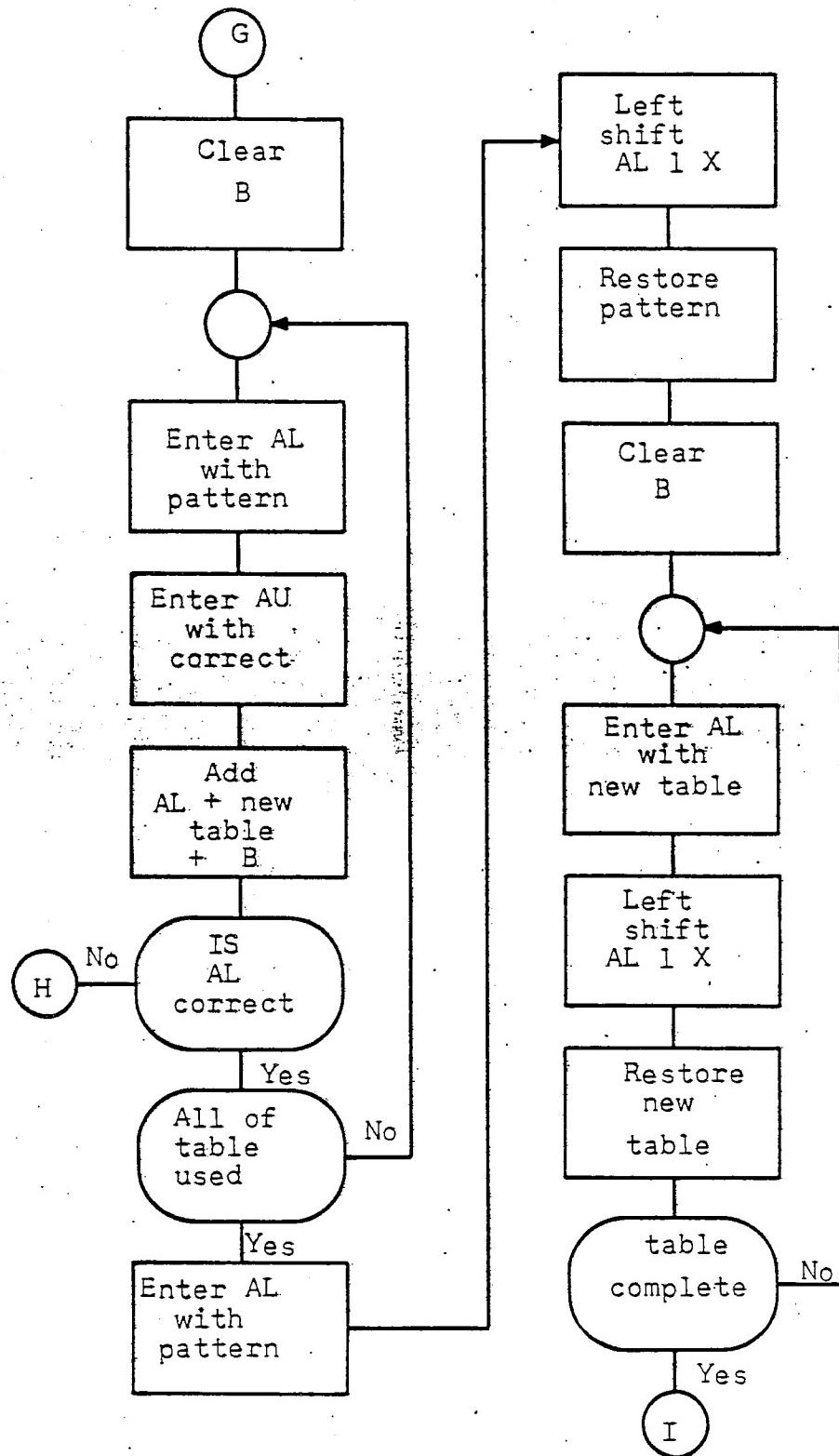


ADER - ADDER TEST

SHEET 596

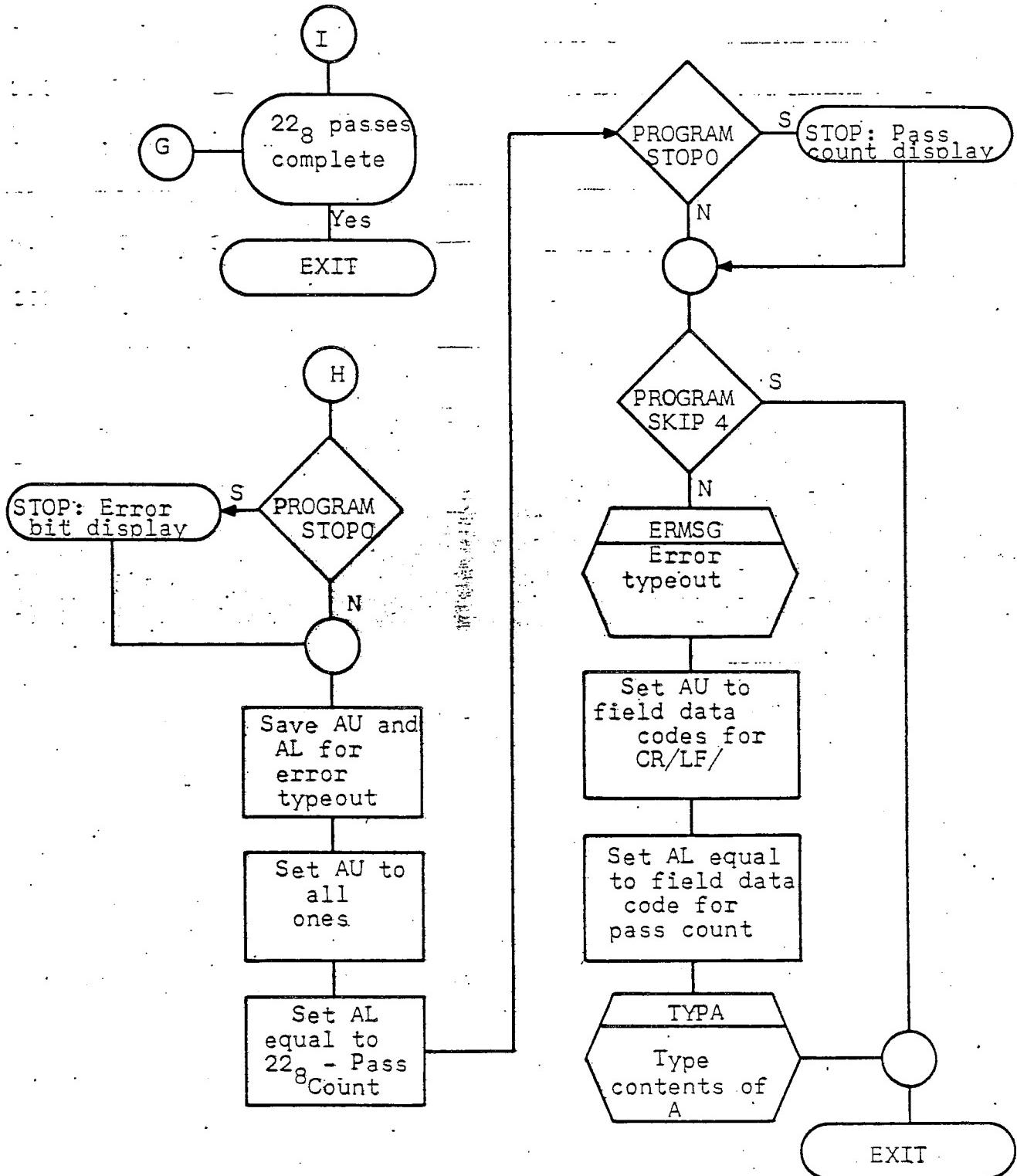
REVISION

SPECIFICATION SYMBOL
ISB-1,0163



ADER - ADDER TEST

SPECIFICATION SYMBOL
SB-10163



ADER - ADDER TEST

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PROGRAM DATA PAGE**SPECIFICATION SHEET**

SHEET 598

REVISION

SPECIFICATION SYMBOL
SB-10163

TITLE: KT - SHIFT COUNTER TEST

DECK IDENTIFIER: FACT

CS-1 LABEL: KT KEY: IS LABEL DUPLICATE? No

PROGRAMMER: KWM modified by: ILR DATE: 8 December 1967

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 48**DESCRIPTION:**

This subroutine, KT, test the K Register as used in a shifting operation.

KT is referenced by subroutine EXEC.

This subroutine tests the K register for left shift of A of 44 and 66 times and for right shifts of A of 42 times and AL of 20 times. Upon an error detection, PROGRAM STOP 0 is referenced. If set an error display occurs on the computer console. If not set, or upon restarting, PROGRAM SKIP 4 is referenced. If not set an error typeout occurs. If set or upon completion of the typeout an exit is made to subroutine EXEC. An exit is also made to EXEC upon successful completion of the test.

PROGRAM DATA PAGE (Cont)

SHEET 599

REVISION —

SPECIFICATION SYMBOL
SB-10163

TITLE: KT - SHIFT COUNTER TEST

INPUT PARAMETERS (Listed Sequentially):

IPAT1+4 = 707070
IPCK = Working Storage
IPAT3 = 125252
TPAT3+1 = 652525
TPAT1+1 = 777777
TPAT1 = 000000

OUTPUT PARAMETERS (Listed Sequentially):

PIN1
PIN2

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

ERMSG

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

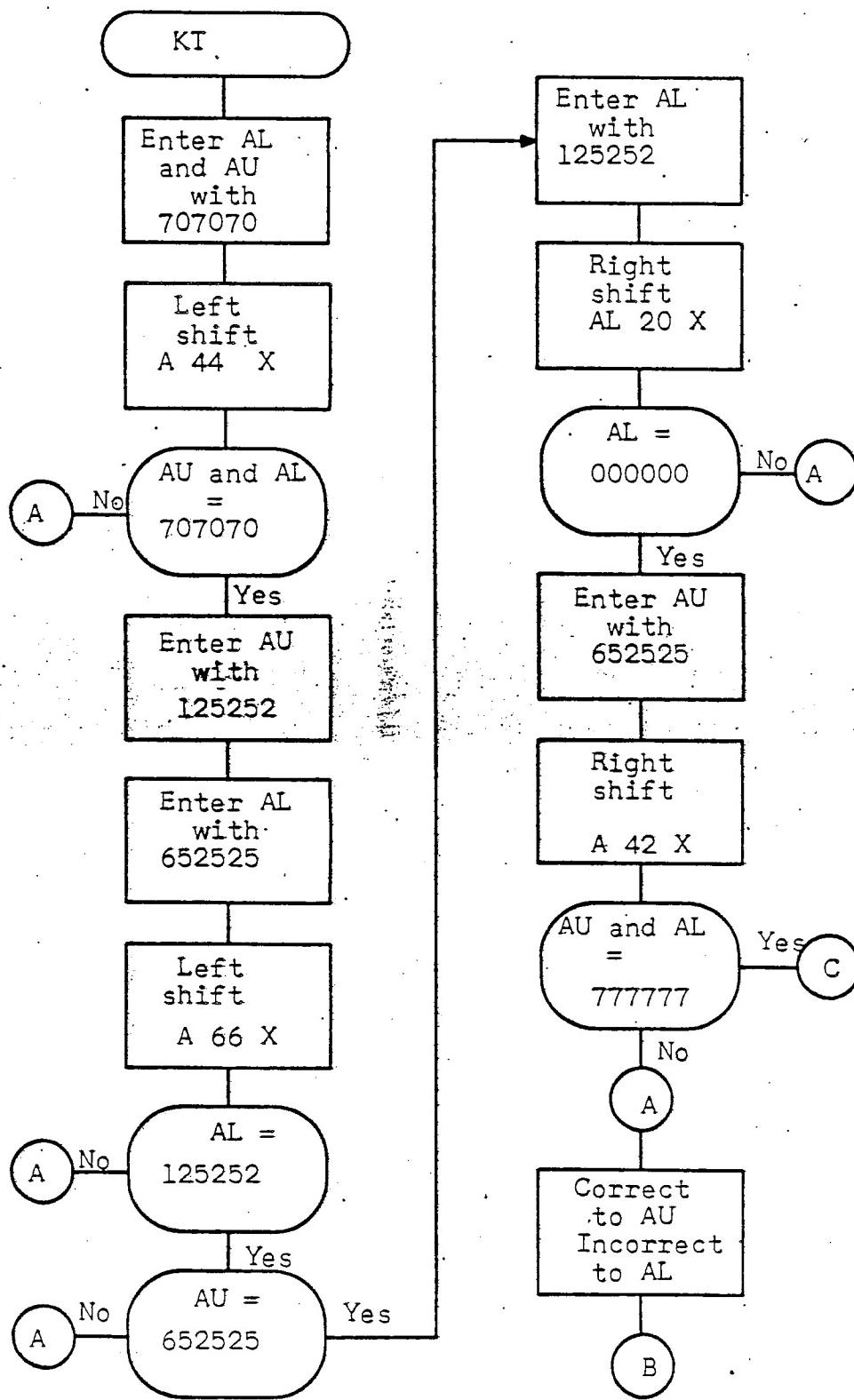
PROGRAM SKIP 4 - Set to suppress typeouts
PROGRAM STOP 0 - Set for computer console error display upon stop:
P = 11460

AU = correct pattern
AL = incorrect pattern

SHEET 600

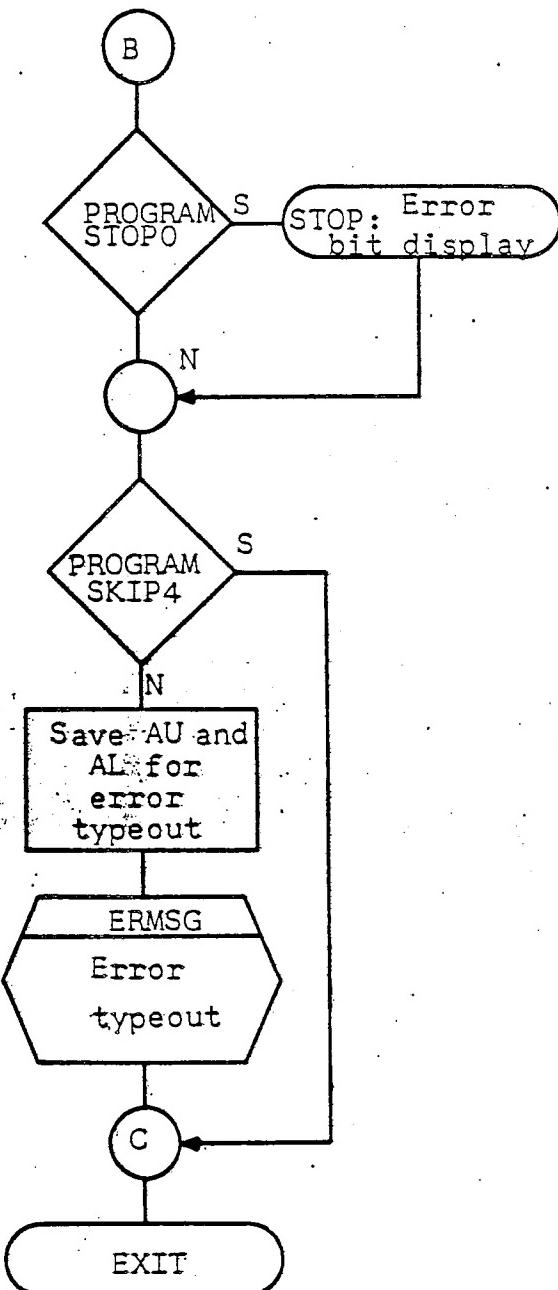
REVISION —

SPECIFICATION SYMBOL
SB-10163



KI - SHIFT COUNTER TEST

SPECIFICATION SYMBOL
SB-10163



KT - SHIFT COUNTER TEST

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PROGRAM DATA PAGE**SPECIFICATION SHEET**

SHEET 602

REVISION

SPECIFICATION SYMBOL
SB-10163

TITLE: CPAL - COMPLEMENT TEST

DECK IDENTIFIER: FACT

CS-1 LABEL: CPAL KEY: IS LABEL DUPLICATE? No

PROGRAMMER: HWM modified by ILR DATE: 8 December 1967

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 89**DESCRIPTION:**

This subroutine, CPAL, checks the complementing circuitry of the arithmetic section.

CPAL is referenced by subroutine EXEC.

The registers are checked by entering various patterns, complementing, and verifying. The registers are checked sequentially in the order: AL, AU, and A. Upon an error detection, PROGRAM STOP 0 is referenced. If set an error display occurs on the computer console. If not set, or upon restarting, PROGRAM SKIP 4 is referenced. If not set an error typeout occurs. If set or upon completion of the typeout an exit is made to EXEC. An exit is also made to EXEC upon successful completion of the test.

SPECIFICATION SYMBOL
SB-10163**TITLE:** CPAL - COMPLEMENT TEST**INPUT PARAMETERS (Listed Sequentially):**

TPAII1 = 000000
TPAII1+3 = 525252
TPAII1+2 = 252525
TPAII1+5 = 070707
TPAII1+4 = 707070
TPAII1+1 = 777777

OUTPUT PARAMETERS (Listed Sequentially):

PTN1
PTN2

ABNORMAL EXITS (Listed Sequentially):**NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):**

ERMSG

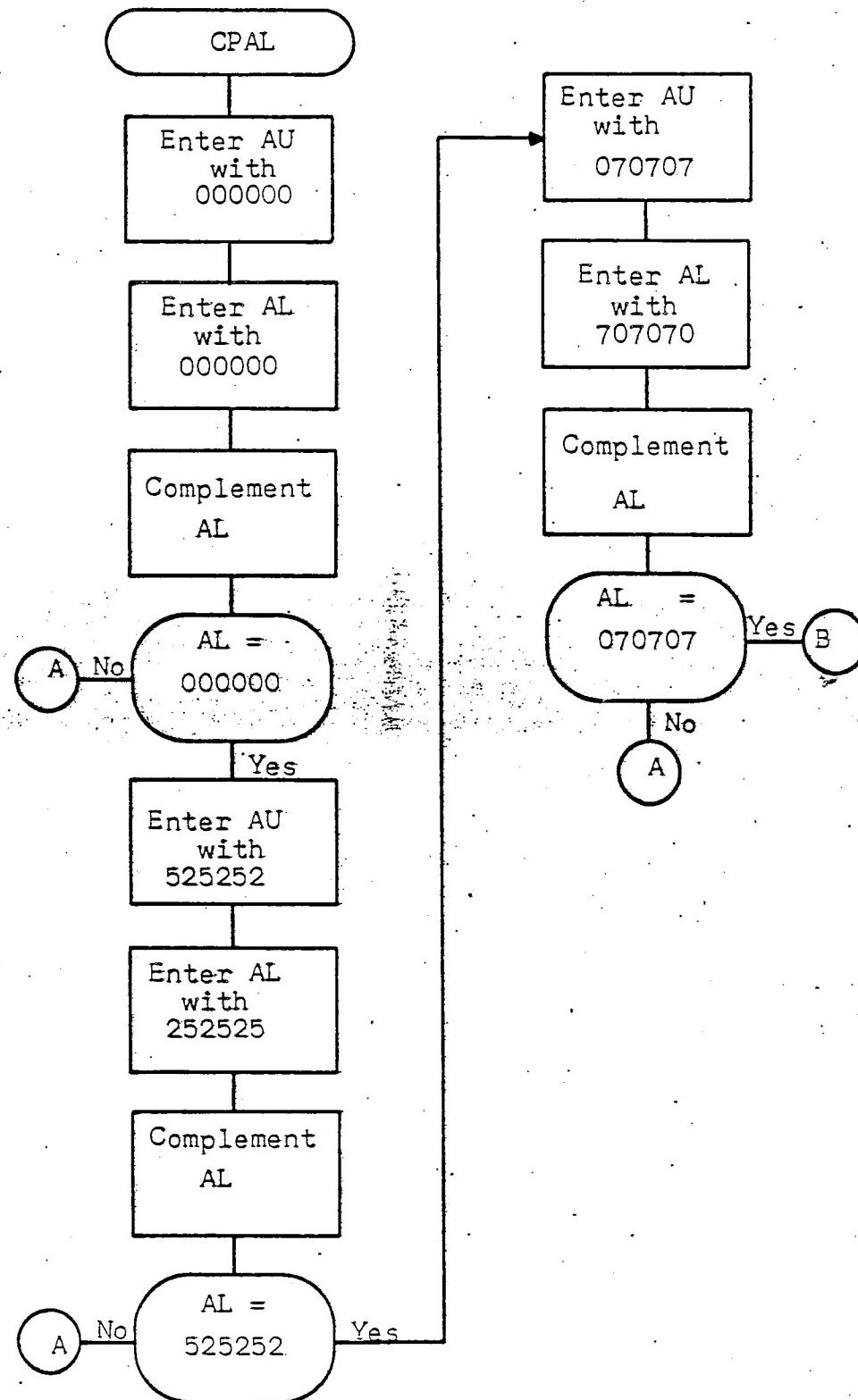
SYSTEM DATA REFERENCES:**ALARMS AND/OR REMARKS:**

PROGRAM SKIP 4 - Set to suppress typeouts.

PROGRAM STOP 0 - Set for computer console error display.

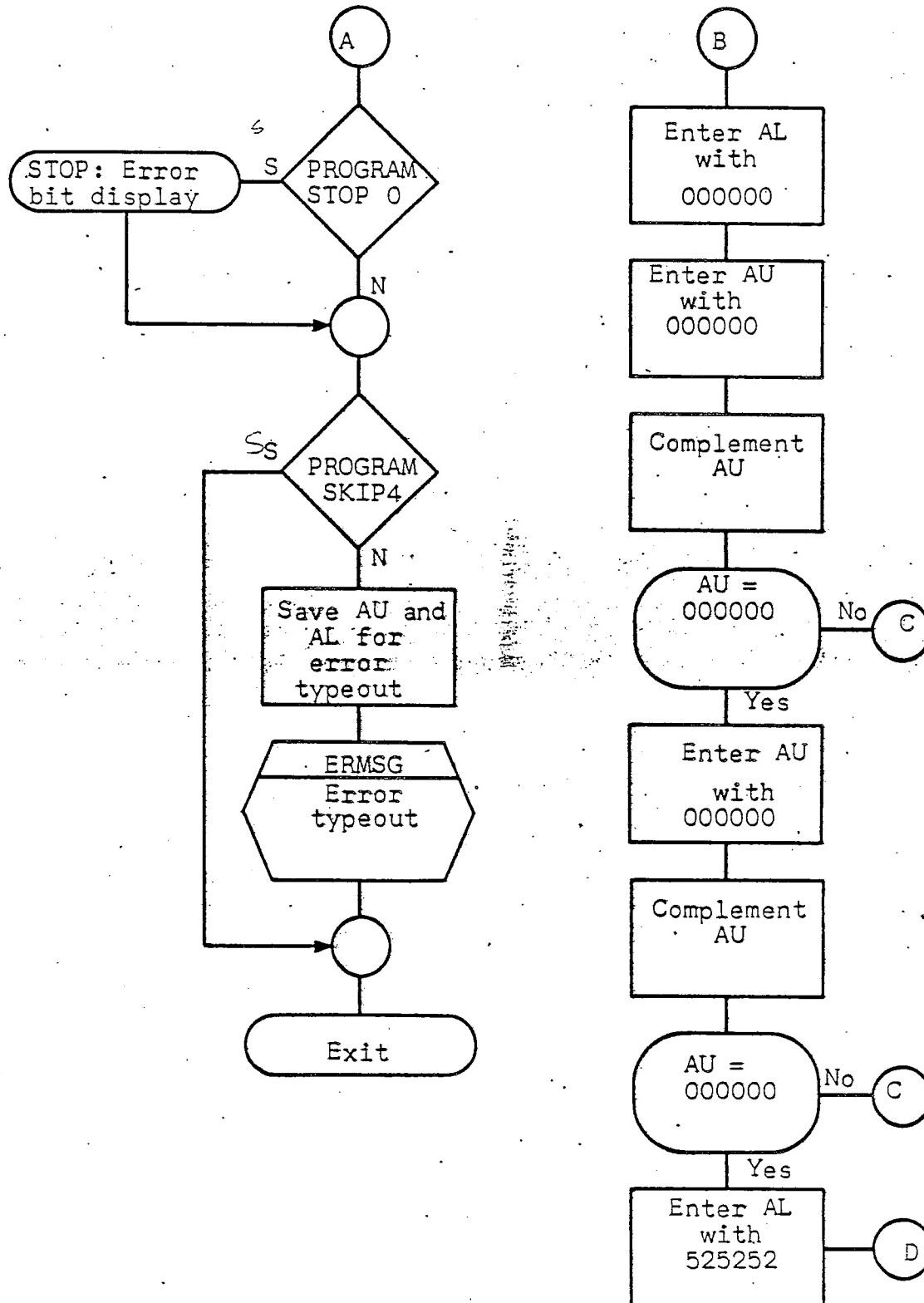
Upon stop: P = 11536 Testing AL P = 11620 Testing A
 AU = correct pattern AU = correct pattern
 AL = incorrect pattern AL = incorrect pattern
P = 11565. Testing AU
AU = correct pattern
AL = incorrect pattern

SPECIFICATION SYMBOL
SB-10163



CPAL - COMPLEMENT TEST

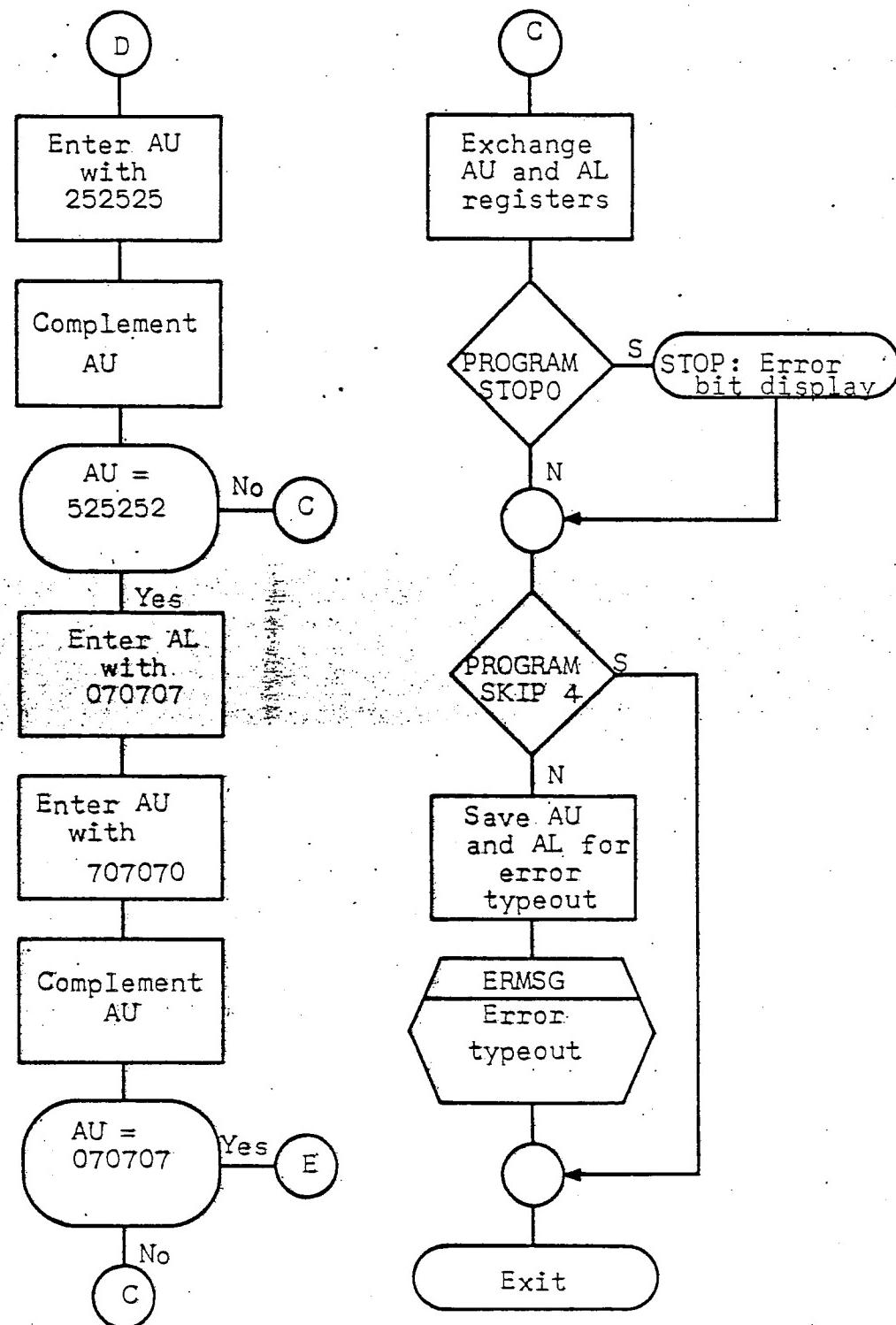
SPÉCIFICATION SYMBOL
SB-10163



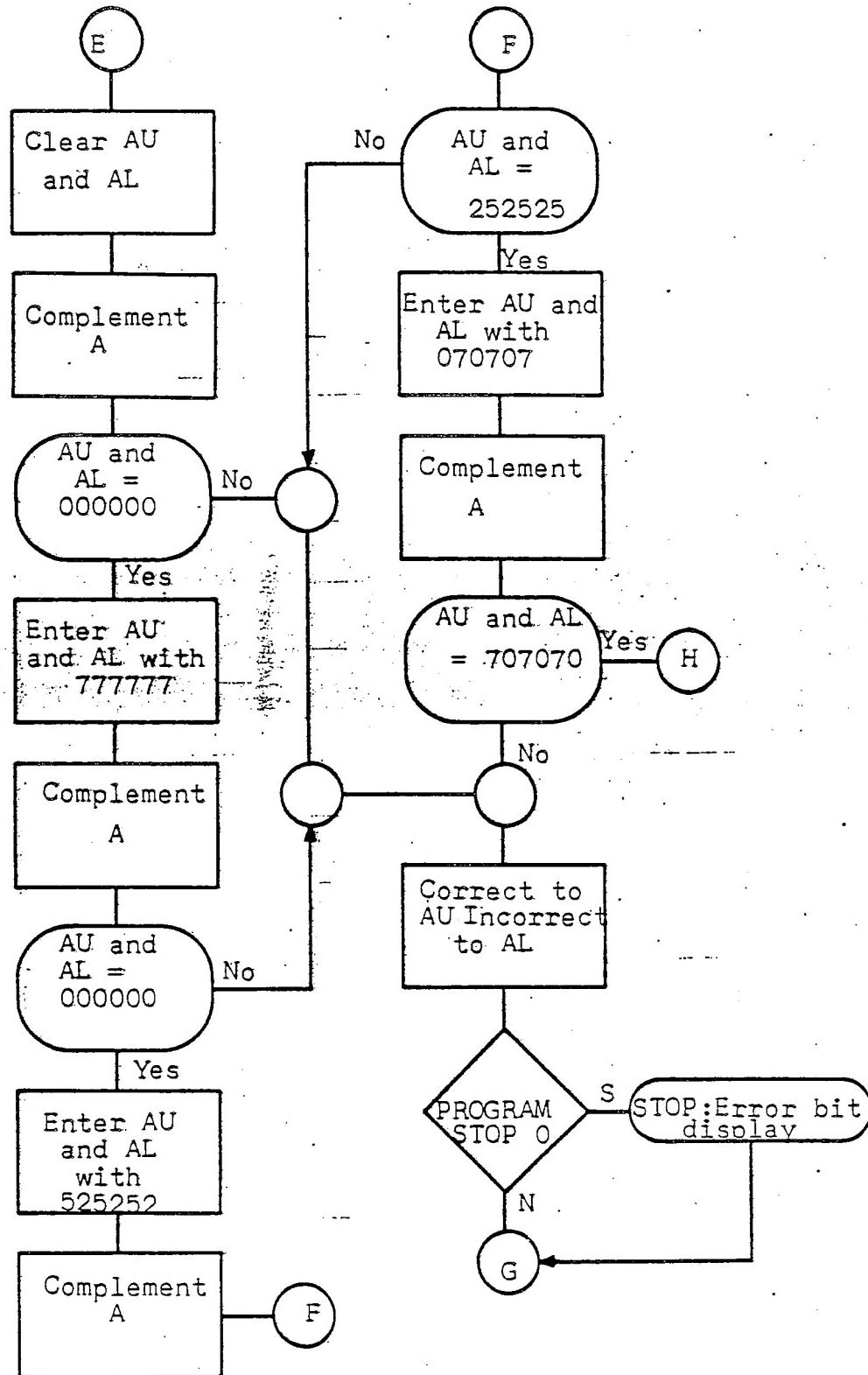
CPAL - COMPLEMENT TEST

SHEET 606 REVISION

SPECIFICATION SYMBOL
SB-10163

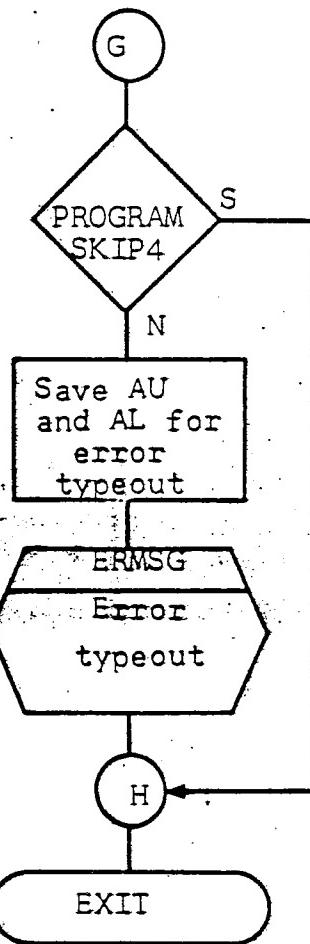


CPAL - COMPLEMENT TEST



CPAL - COMPLEMENT TEST

SHEET 608 REVISION —

SPECIFICATION SYMBOL
SB-10163

CPAL - COMPLEMENT TEST

SHEET 609

REVISION -

SPECIFICATION SYMBOL
SB-10163

TITLE: ADD - TEST BORROW TEST

DECK IDENTIFIER: FACT

CS-1 LABEL: ADD KEY: IS LABEL DUPLICATE? No

PROGRAMMER: HWM modified by TLR DATE: 8 December 1967

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 29

DESCRIPTION:

This subroutine, ADD, checks the Borrow condition generated during a double add or subtract function.

ADD is referenced by subroutine EXEC.

This subroutine, ADD, consists of two adds and one subtract. After the first test Add, a borrow should occur and the program should not skip. After the next add a no borrow should occur, causing the program to skip an instruction. At this time a subtract is performed that requires borrow, no program skip should occur. Upon successful completion of this test an exit is made to subroutine EXEC. If an error occurs PROGRAM STOP 0 is referenced. If set an error display occurs on the computer console. If not set or upon restarting PROGRAM SKIP 4 is referenced. If not set an error typeout occurs. If set or upon completion of the typeout an exit is made to subroutine EXEC.

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PROGRAM DATA PAGE (Cont)

SPECIFICATION SHEET

SHEET: 610

REVISION -

SPECIFICATION SYMBOL
SB-10163

TITLE: ADD - TEST BORROW TEST

INPUT PARAMETERS (Listed Sequentially):

OUTPUT PARAMETERS (Listed Sequentially):

PIN1
PIN2

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

ERMSG

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

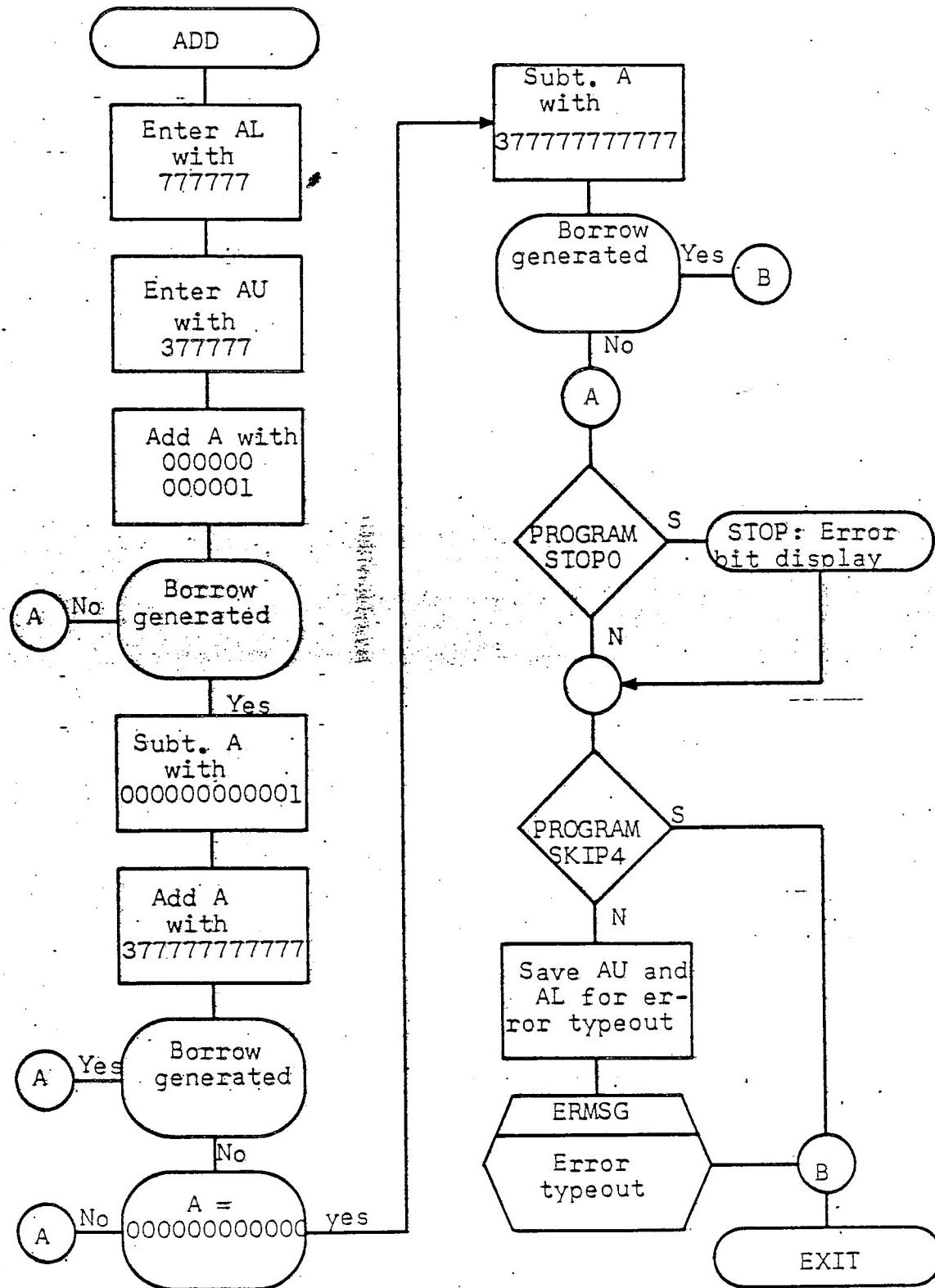
PROGRAM SKIP 4 - Set to suppress timeouts

PROGRAM STOP 0 - Set for computer console error display.

Upon stop P = 11702

AU and AL = sum or difference of double add or subtract

SPECIFICATION SYMBOL
SB-10163



ADD - TEST BORROW TEST

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PROGRAM DATA PAGE**SPECIFICATION SHEET**

SHEET 612

REVISION -

SPECIFICATION SYMBOL
SB-10163

TITLE: MUL - MULTIPLY SIGN TEST

DECK IDENTIFIER: FACT

CS-1 LABEL: MUL KEY: IS LABEL DUPLICATE? No

PROGRAMMER: HWM modified by TLR DATE: 8 December 1967

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 25**DESCRIPTION:**

This subroutine, MUL, checks the multiply instruction using various signs and verifies the sign of the answer.

MUL is referenced by subroutine EXEC.

The order in which the various signs are used is:

	<u>MULTIPLICAND</u>	<u>MULTIPLIER</u>	<u>SIGN OF PRODUCT</u>
a)	+	+	+
b)	+	-	-
c)	-	-	+
d)	-	+	-

Upon error detection PROGRAM STOP 0 is referenced. If set an error display occurs on the computer console. If not set, or upon re-starting, PROGRAM SKIP 4 is referenced. If not set an error typeout occurs. If set or upon completion of the typeout an exit is made to subroutine EXEC. Successful completion of the test also results in an exit to subroutine EXEC.

SPECIFICATION SYMBOL
SB-10163**TITLE:** MUL - MULTIPLY SIGN TEST**INPUT PARAMETERS** (Listed Sequentially):**OUTPUT PARAMETERS** (Listed Sequentially):PIN1
PIN2**ABNORMAL EXITS** (Listed Sequentially):**NEXT LEVEL PROCEDURES OR SUBROUTINES** (Keys of Duplicate Labels Specified):

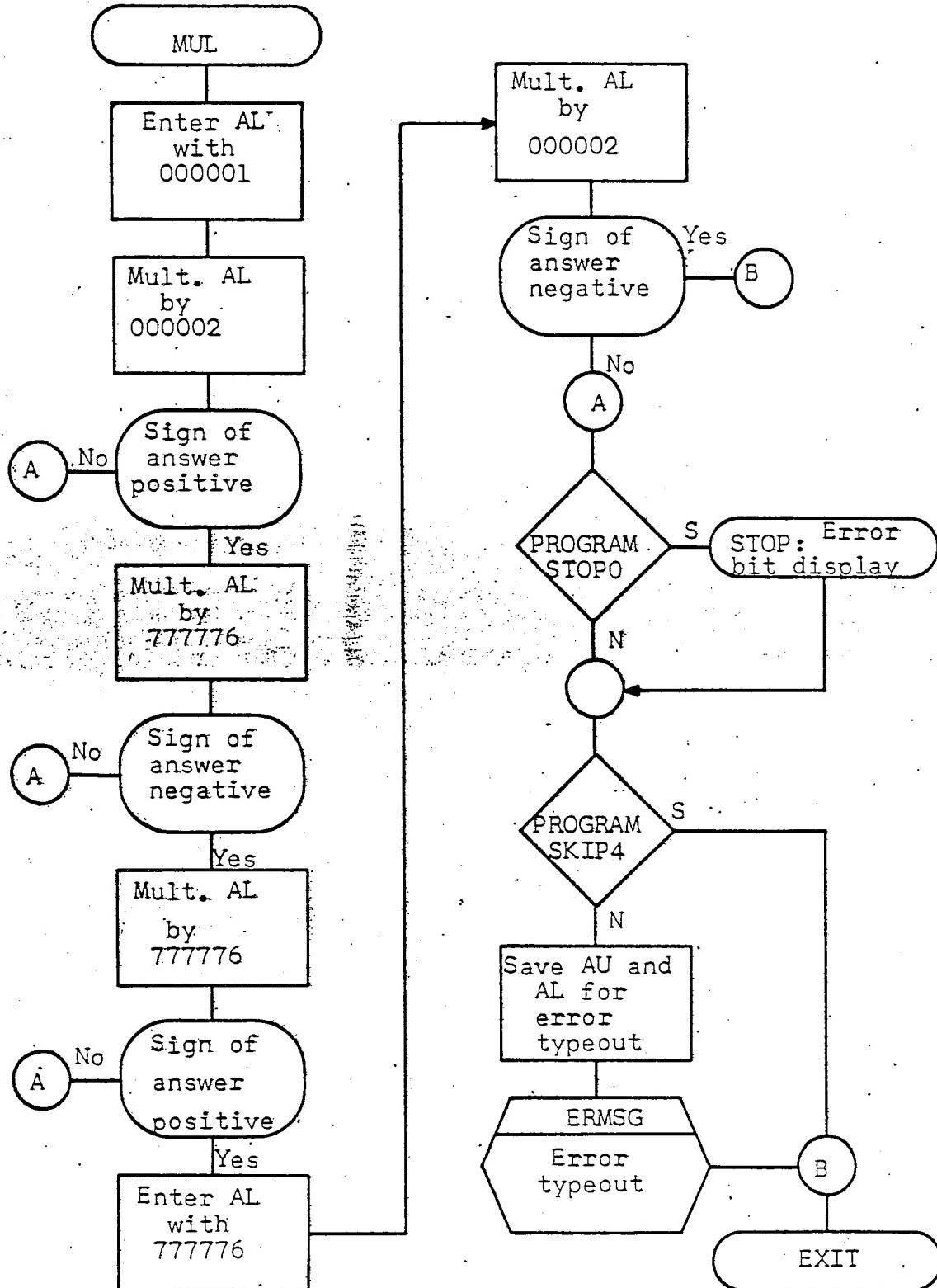
ERMSG

SYSTEM DATA REFERENCES:**ALARMS AND/OR REMARKS:**

PROGRAM SKIP 4 - Set to suppress timeouts

PROGRAM STOP 0 - Set for computer console error display
Upon stop P = 11736

AU and AL contain product of multiply.



MUL - MULTIPLY SIGN TEST

SHEET 615

REVISION

SPECIFICATION SYMBOL
SB-10163

TITLE: DIV - DIVIDE SIGN TEST

DECK IDENTIFIER: FACT

CS-1 LABEL: DIV KEY: IS LABEL DUPLICATE? No

PROGRAMMER: HWM modified by FLR DATE: 8 December 1967

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 72

DESCRIPTION:

This subroutine, DIV, checks divide instructions using various signs and verifies the sign of the answer.

DIV is referenced by subroutine EXEC.

The order in which the various signs are used is:

	DIVIDEND	DIVISOR	QUOTIENT	REMAINDER	ERROR STOP
a)	+	+	+	+	P = 11756
b)	+	-	-	+	P = 11775
c)	-	+	-	-	P = 12017
d)	-	-	+	-	P = 12036

Upon error detection PROGRAM STOP 0 is referenced. If set an error display occurs on the computer console. If not set, or upon restarting, PROGRAM SKIP 4 is referenced. If not set an error typeout occurs. If set or upon completion of the typeout an exit is made to subroutine EXEC. Successful completion of the test also results in an exit to subroutine EXEC.

PROGRAM DATA PAGE (Cont)

SHEET 616

REVISION -

SPECIFICATION SYMBOL
SB-10163**TITLE:** DIV - DIVIDE SIGN TEST**INPUT PARAMETERS (Listed Sequentially):**

TPAT1+1 = 777777

DVT12 = 777777

OUTPUT PARAMETERS (Listed Sequentially):

PTN1

PTN2

ABNORMAL EXITS (Listed Sequentially):**NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):**

ERMSG

SYSTEM DATA REFERENCES:**ALARMS AND/OR REMARKS:**

PROGRAM SKIP 4 - Set to suppress error timeouts

PROGRAM STOP 0 - Set for computer console error display.

Upon stop P = 11756

AU and AL = incorrect result of divide

P = 11775

AU and AL = incorrect result of divide

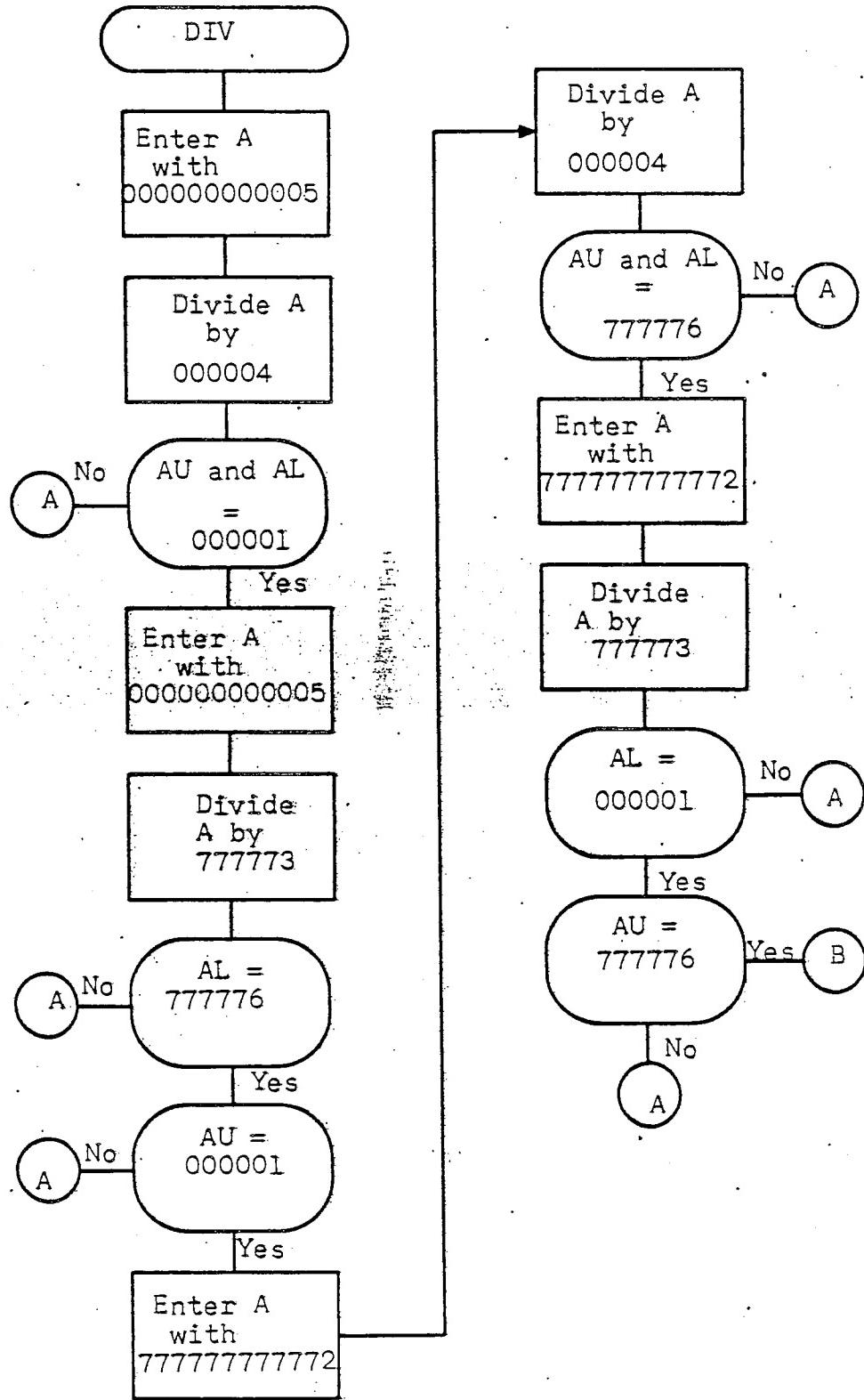
P = 12017

AU and AL = incorrect result of divide

P = 12036

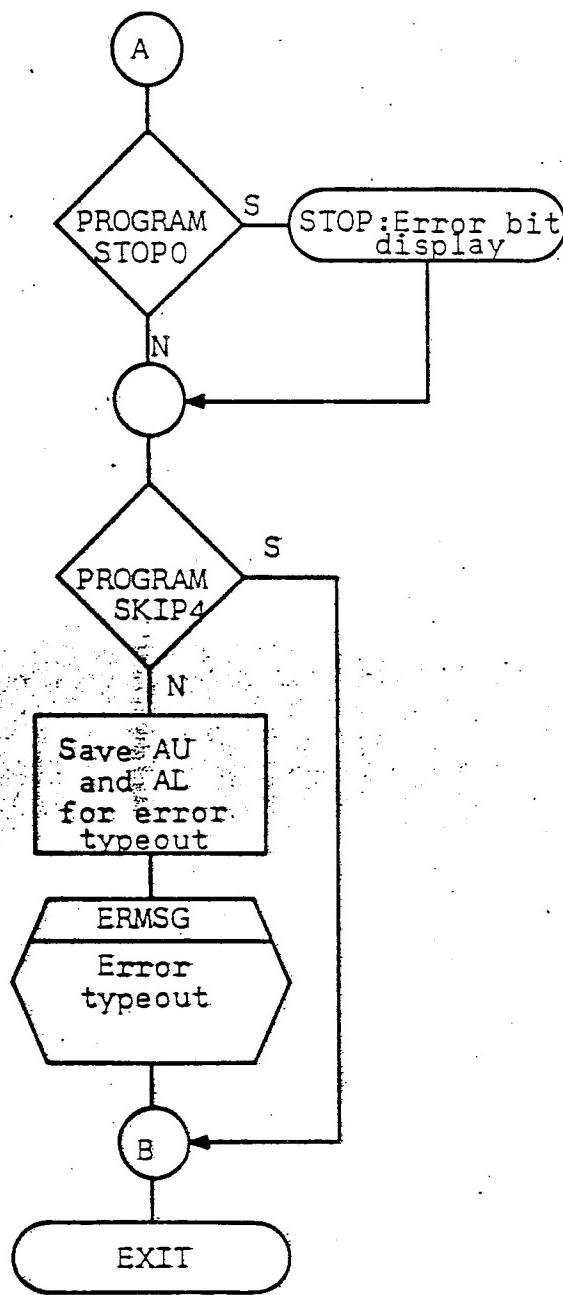
AU and AL = incorrect result of divide

SPECIFICATION SYMBOL
SB-10163



DIV - DIVIDE SIGN TEST

SPECIFICATION SYMBOL
SB-10163



DIV - DIVIDE SIGN TEST

SHEET 619

REVISION -

SPECIFICATION SYMBOL
SB-10163

TITLE: DVT - DIVIDE TEST

DECK IDENTIFIER: FACT

CS-1 LABEL: DVT KEY: IS LABEL DUPLICATE? No

PROGRAMMER: HWM modified by TLR DATE: 8 December 1967

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 35

DESCRIPTION:

This subroutine, DVT, tests the Divide portion of the arithmetic section.

DVT is referenced by subroutine EXEC.

This subroutine goes through a series of divides, checking the quotient in AL and verifying the remainder in AU. If a quotient error is detected PROGRAM STOP 0 is referenced. If set an error display occurs on the computer console. If not set, or upon restarting, PROGRAM SKIP 4 is referenced. If not set an error typeout occurs. If set, or upon completion of the typeout an exit occurs to EXEC. The bit errors that occur in the remainder are accumulated during the test, if any occur at all, by selective setting them in a memory location. If any such error occurred PROGRAM STOP 0 is referenced. If set an error display occurs on the computer console. If not set or upon restarting PROGRAM SKIP 4 is referenced. If not set an error typeout showing the failing bits occurs. If set or upon completion of the typeout an exit is made to subroutine EXEC. An exit to EXEC is also made upon successful completion of this test.

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PROGRAM DATA PAGE (Cont)

SPECIFICATION SHEET

SHEET 620

REVISION -

SPECIFICATION SYMBOL
SB-10163

TITLE: DVT - DIVIDE TEST

INPUT PARAMETERS (Listed Sequentially):

DT3 = Error Bit Storage
DT1 = Pattern Table+B
DT2 = Table+B
TPAT1+1 = 777777
DT4 = Error Bit Table+B
DVT13 = 000020

OUTPUT PARAMETERS (Listed Sequentially):

PTN1
PTN2

ABNORMAL EXITS (Listed Sequentially):

NEXT LEVEL PROCEDURES OR SUBROUTINES (Keys of Duplicate Labels Specified):

ERMSG

SYSTEM DATA REFERENCES:

ALARMS AND/OR REMARKS:

PROGRAM SKIP - Set to suppress error timeouts

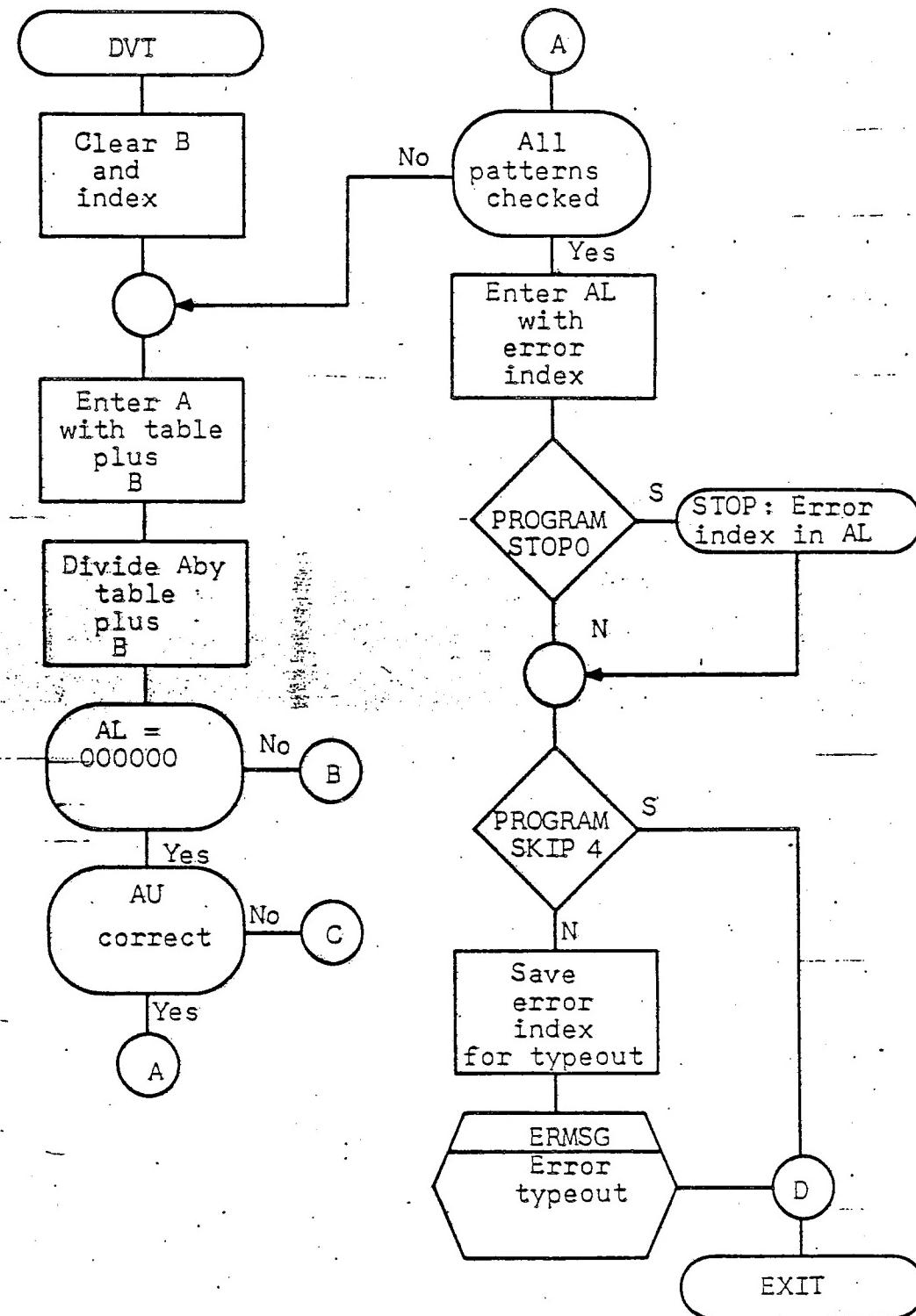
PROGRAM STOP 0 - Set for computer console error display
Upon stop

P = 12067

AL = incorrect pattern

P = 12112

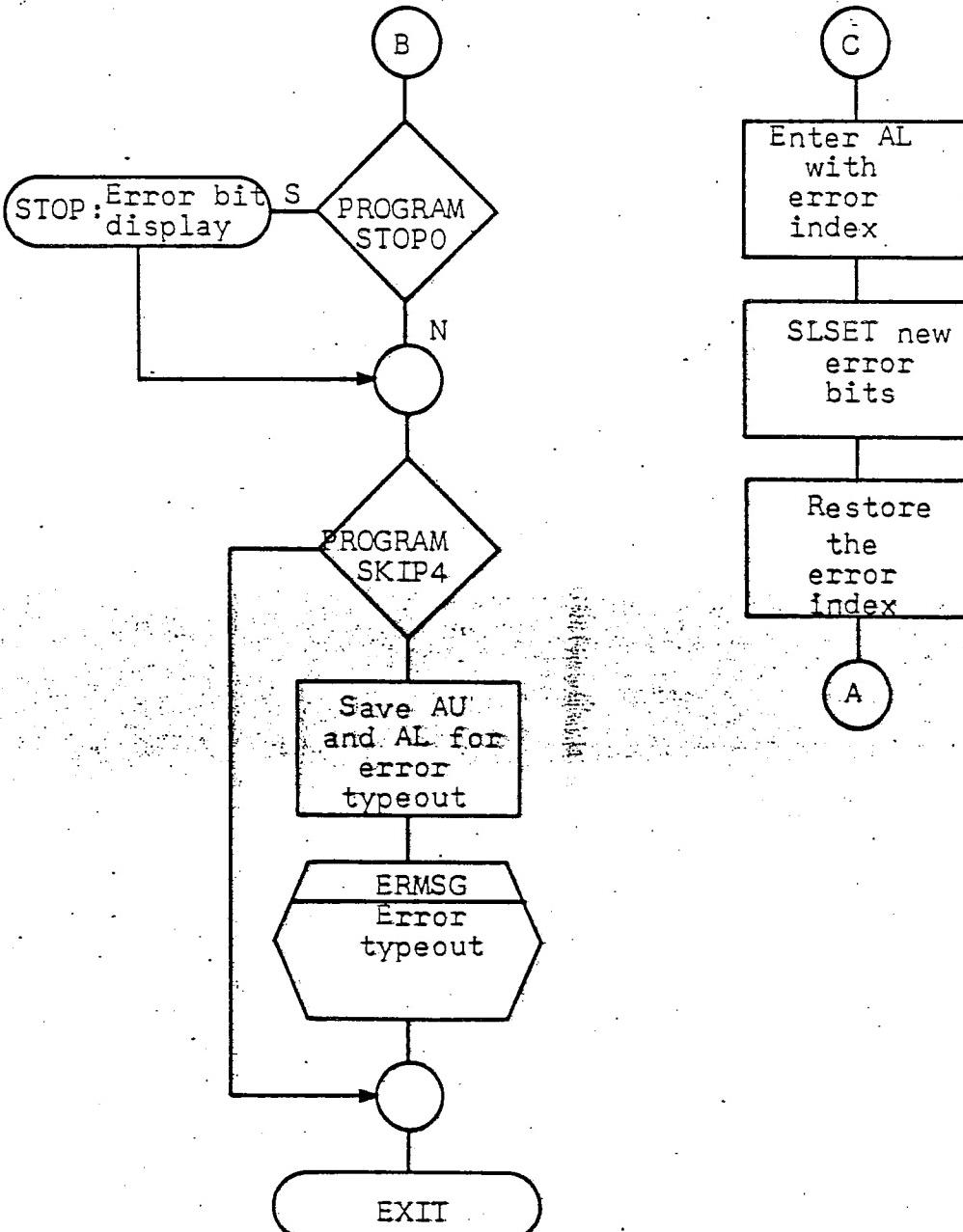
AL = bits that failed in remainder AU after divide
was executed.



DVT - DIVIDE TEST

SHEET 622 REVISION -

SPECIFICATION SYMBOL
SB-10163



DVT - DIVIDE TEST

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PROGRAM DATA PAGE

SPECIFICATION SHEET

SHEET 623 REVISION

**SPECIFICATION SYMBOL
SB-10163**

TITLE: CONSTA - CONSTANTS

DECK IDENTIFIER: FACT

CS-1 LABEL: CONSTA KEY: IS LABEL DUPLICATE? No

PROGRAMMER: HWM modified by TLR DATE: 8-December 1967

NUMBER OF L₄ OUTPUT INSTRUCTIONS: 146

DESCRIPTION:

CONSTA contains the constants, patterns, and tables used in executing the ARITHMETIC TEST.